**DEPARTMENT OF THE INTERIOR**
**BUREAU OF LAND MANAGEMENT**
**FARMINGTON FIELD OFFICE**

**Project: October 2014 Competitive Oil and Gas Lease Sale**
**EA Log Number: DOI-BLM-NM-F010-2014-0154-EA**
**Location: Locations in Rio Arriba, Sandoval and San Juan County, New Mexico.**

## Finding of No Significant Impact

Based on the analysis of potential environmental impacts contained in the attached Environmental Assessment (EA), I have determined the Proposed Action Alternative (Alternative B) is not expected to have significant impacts on the environment. The impacts of leasing the fluid mineral estate in the areas described with this EA have been previously analyzed in the 2003 Farmington RMP, the 2002 Biological Assessment, and the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest; and the lease stipulations that accompany the tracts proposed for leasing would mitigate the impacts of future development on these tracts. Therefore, preparation of an Environmental Impact Statement is not warranted.

Reviewed by:

_____Date_____
Gary Torres, Farmington Field Office Manager

Approved by:

_____Date_____
Jesse Juen, New Mexico State Director

**BUREAU OF LAND MANAGEMENT**
**FARMINGTON FIELD OFFICE**

# ENVIRONMENTAL ASSESSMENT FOR OCTOBER 2014 COMPETITIVE OIL AND GAS LEASE SALE DOI-BLM-NM-F010-2014-0154-EA[i]

## INTRODUCTION

It is the policy of the Bureau of Land Management (BLM) as derived from various laws, including the Mineral Leasing Act of 1920 (MLA), as amended [30 U.S.C. 181 *et seq*.], and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, to make mineral resources available for disposal and to manage for multiple resources which include the development of mineral resources to meet national, regional, and local needs.

The BLM New Mexico State Office (NMSO) conducts a quarterly competitive lease sale to offer available oil and gas lease parcel(s) in New Mexico, Oklahoma, Texas, and Kansas. A Notice of Competitive Lease Sale (NCLS), which lists lease parcel(s) to be offered at the auction, is published by the NMSO at least 90 days before the auction is held. Lease stipulations applicable to each parcel(s) are specified in the Sale Notice. The decision as to which public lands and minerals are open for leasing and what leasing stipulations are necessary, based on information available at the time, is made during the land use planning process. Surface management of non-BLM administered land overlaying federal minerals is determined by the BLM in consultation with the appropriate surface management agency or the private surface owner.

In the process of preparing a lease sale the NMSO sends a draft parcel list to any Field Offices in which parcel(s) are located. Field office staff then review the legal descriptions of the parcel(s) to determine if they are in areas open to leasing; if new information has become available which might change any analysis conducted during the planning process; if appropriate consultations have been conducted; what appropriate stipulations should be included; and if there are special resource conditions of which potential bidders should be made aware. The parcels nominated for this sale, along with the appropriate stipulations from the 2003 Farmington Resource Management Plan (RMP) and subsequent amendments, are posted online for a two week public scoping period. Comments received are reviewed and incorporated into the Environmental Assessment (EA).

Once the draft parcel review is completed and returned to the NMSO, a list of nominated lease parcel(s) with specific, applicable stipulations is made available online to the public through a NCLS. On rare occasions, additional information obtained after the publication of the NCLS may result in deferral of certain parcel(s) prior to the lease sale.

This EA documents the Farmington Field Office (FFO) review of thirty five (35) parcels nominated for the October 2014 Competitive Oil and Gas Lease Sale. Thirteen (13) parcels are located on the surface estate administered by the Cuba Ranger District, Santa Fe National Forest with the mineral estate under the administration of the FFO. Of the remaining 22 parcels five (5)

are private surface/federal minerals and seventeen (17) are Navajo allotted lands/ federal minerals. This EA serves to verify conformance with the approved land use plan, provides the rationale for deferring or dropping parcel(s) from a lease sale, as well as providing rationale for attaching additional notice to specific parcel(s). Where the surface is administered by the Forest Service and the mineral estate is also federally owned, the Forest Service and BLM share the responsibility for enforcing mineral leasing policies and regulations. Forest Service regulations under 36 CFR 228.102(e) allow the agency to authorize the BLM to lease individual, specified areas of land administratively available for lease and include the stipulations determined to be necessary.

The BLM issues and administers oil and gas leases on Forest Service lands only after the Forest Service authorizes leasing for specific lands. Once a Federal lease is issued on Forest Service lands, the Forest Service has the full responsibility and authority to approve and regulate all surface disturbing activities associated with oil and gas exploration and development through analysis and approval of the surface use plan of operation (SUPO) component of an Application for Permit to Drill (APD). The BLM has the authority and responsibility to provide final approval of all APDs including those for operations on Federal leases on Forest Service lands. Each APD includes a SUPO and a drilling plan. The BLM has the authority and responsibility to regulate all downhole operations and directly related surface activities and use, and provide approval of the drilling plan and final approval of the APD on Forest Service lands (USDA/USDI 2006).

The parcels and applicable stipulations were posted online for a two week public scoping period starting on March 10, 2014. Scoping comments were received from Amigos Bravos, The State of New Mexico Department of Cultural Affairs Historic Preservation Division, the Hopi Tribe, Counselor Chapter, Ojo Encino Chapter, Western Environmental Law Center, San Juan Citizens Alliance (SJCA), Old Spanish Trail Association (OSTA), and numerous private citizens. In addition, this EA will be made available for public review and comment for 30 days beginning May 1, 2014. Any comments provided prior to the lease sale will be considered and incorporated into the EA as appropriate.

**Purpose and Need**

The purpose is to consider opportunities for private individuals or companies to explore for and develop oil and gas resources on public lands through a competitive leasing process.

The need of the action is established by the BLM's responsibility under the MLA, as amended, to promote the exploration and development of oil and gas on the public domain. The MLA also establishes that deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA under the rules and regulations prescribed by the Secretary of the Interior, where consistent with the FLPMA, the National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-90, 42 USC 4321 et seq.*)*, and other applicable laws, regulations, and policies.

The BLM will decide whether or not to lease the nominated parcel(s) and, if so, under what terms and conditions.

**Conformance with Applicable Land Use Plan and Other Environmental Assessments**

The applicable land use plan for this action is the 2003 Farmington RMP. The RMP designated approximately 2.59 million acres of federal minerals open for continued oil and gas development and leasing under Standard Terms and Conditions. The RMP, along with the 2002 Biological Assessment, also describe specific stipulations that would be attached to new leases offered in certain areas. Therefore, it is determined that the alternatives considered conform to fluid mineral leasing decisions in the 2003 Farmington RMP and subsequent amendment and are consistent with the goals and objectives for natural and cultural resources.

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this EA is tiered to and incorporates by reference the information and analysis contained in the 2003 Farmington RMP Final Environmental Impact Statement. While it is unknown precisely when, where, or to what extent well sites or roads would be proposed, the analysis of projected surface disturbance impacts, should a lease be developed, is based on potential well densities listed in the Reasonable Foreseeable Development (RFD) Scenario included in the 2003 Farmington RMP and the 2002 Biological Assessment. While an appropriate level of site-specific analysis of individual wells or roads would occur when a lease holder submits an Application for Permit to Drill (APD), assumptions based on the RFD scenario may be used in the analysis of impacts in this EA.

FLPMA established guidelines to provide for the management, protection, development, and enhancement of public lands (Public Law 94-579). Section 103(e) of FLPMA defines public lands as any lands and interest in lands owned by the U.S. For split-estate lands where the mineral estate is an interest owned by the U.S., the BLM has no authority over use of the surface by the surface owner; however, the BLM is required to declare how the federal mineral estate will be managed in the RMP, including identification of all appropriate lease stipulations (43 CFR 3101.1 and 43 CFR 1601.0-7(b); BLM Manual Handbook 1601.09 and 1624-1).

**Federal, State or Local Permits, Licenses or Other Consultation Requirements**

Purchasers of oil and gas leases are required to comply with all applicable federal, state, and local laws and regulations, including obtaining all necessary permits required should lease development occur.

Farmington Field Office biologists reviewed the proposed action and determined it would be in compliance with threatened and endangered species management guidelines outlined in Biological Opinions Cons. #2-22-01-I-389. No further consultation with the U.S. Fish and Wildlife Service (USFWS) is required at this stage.

Federal regulations and policies require the BLM to make its public land and resources available on the basis of the principle of multiple-use. At the same time, it is BLM policy to conserve special status species and their habitats, and to ensure that actions authorized by the BLM do not contribute to the need for the species to become listed as threatened or endangered by the USFWS.

Compliance with Section 106 responsibilities of the National Historic Preservation Act (NHPA) are adhered to by following 36 CFR Part 800. Native American consultation is conducted by

mail regarding each lease sale activity. A second request for information is sent to the same recipients as needed (e.g. no response to the first inquiry). at . If no response to the second letter is received and no other substantial conflicts or issues are identified, the parcel(s) are offered for sale

If any responses are received, BLM cultural resources staff will discuss the information or issues of concern with the respondent to determine if all or portions of a parcel need to be withdrawn from the sale, or if stipulations need to be attached as lease stipulations.

In Section 1835 of the Energy Policy Act of 2005 (43 U.S.C. 15801), Congress directed the Secretary of the Interior to review current policies and practices with respect to management of federal subsurface oil and gas development activities and their effects on the privately owned surface. The Split Estate Report, submitted in December 2006, documents the findings from consultation on the split estate issue with affected private surface owners, the oil and gas industry, and other interested parties.

In 2007, the Legislature of the State of New Mexico passed the Surface Owners Protection Act. This Act requires operators to provide the surface owner at least five business days' notice prior to initial entry upon the land for activities that do not disturb the surface; and provide at least 30 days' notice prior to conducting actual oil and gas operations. At the New Mexico Federal Competitive Oil and Gas Lease Sale conducted on October 17, 2007, the BLM announced the implementation of this policy. Included in this policy is the implementation of a Notice to Lessees (NTL), a requirement of lessees and operators of onshore federal oil and gas leases within the State of New Mexico to provide the BLM with the names and addresses of the surface owners of those lands where the Federal Government is not the surface owner, not including lands where another federal agency manages the surface.

The BLM NMSO office would then contact the surface owners and notify them of the expression of interest and the date the oil and gas rights would be offered for competitive bidding. The BLM would provide the surface owners with its website address so they may obtain additional information related to the oil and gas leasing process, the imposition of any stipulations on that lease parcel(s), federal and state regulations, and best management practices (BMPs). The surface owners may elect to protest the leasing of the minerals underlying their surface.

If the BLM receives a protest, the parcel(s) would remain on the lease sale; however, the BLM would resolve any protest prior to issuing an oil and gas lease for that parcel(s). If the protest is upheld, the BLM would return the payments received from the successful bidder for that parcel(s). After the lease sale has occurred, the BLM would post the results on its website and the surface owner may access the website to learn the results of the lease sale.

**Identification of Issues**

Planning issues are points of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. Based on external and internal scoping and the scoping comments that were received, the following planning issues were identified:

Nominated parcels included the Proposed Action, Preferred Alternative, and the Alternatives Considered but Eliminated from Detailed Analysis, and along with the appropriate stipulations

from the RMP were posted online at: http://www.blm.gov/nm/st/en/prog/energy/oil_and_gas/oil_and_gas_lease.html for a two week public scoping period beginning March 10 through March 24, 2014.

Based on these efforts the following issues have been determined relevant to the analysis of this action:

- *What effects will the proposed action have on the wildlife, special status species, and migratory birds?*
- *What effects will the proposed action have on air quality and climate?*
- *What effects will the proposed action have on water quality?*
- *What effects will the proposed action have on soil resources?*
- *What effects will the proposed action have on dark sky resources?*
- *What effects will the proposed action have on cultural resources and landscapes?*
- *What effects will the proposed action have on socio economics?*
- *What effects will the proposed action have on Environmental Justice?*
- *What effects will the proposed action have on the Old Spanish Trail*.

Issues considered during project scoping but dismissed from detailed analysis because there would be no potentially significant effects related to the issues resulting from any of the alternatives presented below.

- *What effects will the proposed action have on Visual Resource*?
  Visual Resource Inventory is only conducted on BLM surface, because none of the parcels contain BLM surface Visual Resource Inventory will not be discussed. Visual Resource Management classes only apply on public lands and are conducted in accordance with BLM Handbook 8410 and BLM Manual 8411, because none of the parcels contain BLM surface VRM classes will not be analyzed.

The following resources were determined by an ID Team of resource specialists, following their onsite visit and review of the RMP and other data sources to not be present were: Areas of Critical Environmental Concern, Floodplains, Wild and Scenic Rivers, Wetlands/Riparian Zones, Rangeland Resources, and Wild Horses and Burros.

## PROPOSED ACTION AND ALTERNATIVES

**Alternative A - No Action**

In the case of a lease sale, an expression of interest to lease (parcel nomination) would be denied or rejected, and the thirty-five (35) parcels would not be offered for lease during the October

2014 Competitive Oil and Gas Lease Sale. Surface management and any ongoing oil and gas development on surrounding federal, private, and state leases would continue under current guidelines and practices. Selection of the no action alternative would not preclude these parcels from being nominated and considered in future lease sale.

**Alternative B – Proposed Action**

The Proposed Action is to lease twenty-five (25) nominated parcels of federal minerals administered by the Bureau of Land Management, Farmington Field Office, covering 23,325.4 acres. Standard terms and conditions as well as lease stipulations listed in the BLM FFO RMP (as amended), BIA stipulations per Navajo Area Bureau of Indian Affairs Surface Management Agency Lease Stipulations for Federal Oil and Gas Lease Offerings, and the USDA Santa Fe National Forest FEIS for Oil-Gas Leasing and Roads Management would apply.

Once sold, the lease purchaser has the exclusive right to use as much of the leased lands as is necessary to explore and drill oil and gas within the lease boundaries, subject to the stipulations attached to the lease (Title 43 CFR 3101.1-2).

Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, exclusive right to develop the leasehold reverts back to the federal government and the lease can be reoffered in another sale.

Drilling of wells on a lease is not permitted until the lease owner or operator secures approval of a drilling permit and a surface use plan specified under Onshore Oil and Gas Orders listed in Title 43 CFR 3162. A permit to drill would not be authorized until site-specific NEPA analysis is conducted.

Site specific mitigation measures and Best Management Practices (BMPs) would be attached as Conditions of Approval (COAs) for each proposed exploration and development activity authorized on a lease.

The parcels recommended for leasing under the Alternative B – Proposed Action are presented below in
Table 1.

Standard terms and conditions as well as lease stipulations from the BLM FFO 2003 RMP and Lease Notices developed through the parcel review and analysis process would apply (as required by Title 43 CFR 3101.3) to address site specific concerns or new information not identified in the land use planning process.

Table 1. Alternative B: Proposed Action

| Lease Parcel # | Legal Description | Acres | Lease Stipulations* |
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| NM-201410-001 | T.0250N, R.0010E, NM PM, NM<br>Sec. 016 ALL;<br>021 NWNE, E2W2, SWSW;<br>021 N2NENE, N2SWNE, SWSWNE;<br>021 W2SWNENE, W2SESWNE;<br>021 S2NWSW, W2W2SE;<br>021 SESWSE, S2N2SESE;<br>021 SWSESE, S2NESWSE;<br>Rio Arriba County – Farmington Field Office<br>SANTA FE NATIONAL FOREST | 1035 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3B Retention Visual Quality Objective<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-002 | T.0250N, R.0010E, NM PM, NM<br>Sec. 028 E2NW, NWNW, NESW;<br>Rio Arriba County - Farmington Field Office<br>Private Surface | 160 | NM-11-LN Special Cultural Resource<br>F-4-TLS Seasonal Wildlife Habitat<br>F-15-POD Plan of Development<br>F-46-CSU Topography<br>F-41-LN |
| NM-201410-003 | T.0250N, R.0010E, NM PM, NM<br>Sec. 033 S2NE, N2SE, SESE;<br>Rio Arriba County - Farmington Field Office<br>Private Surface | 200 | NM-11-LN Special Cultural Resource<br>F-4-TLS Seasonal Wildlife Habitat<br>F-15-POD Plan of Development<br>F-46-CSU Topography<br>F-41-LN |
| NM-201410-004 | T.0260N, R.0010E, NM PM, NM<br>Sec. 004 LOTS 3,4;<br>004 SWNE, SENW;<br>004 NWSE, S2SE;<br>004 N2SWNW, N2SWSWNW;<br>004 SESWSWNW, SESWNW;<br>004 W2W2NESE, SESWNESE;<br>004 S2SENESE;<br>009 LOTS 4;<br>009 NE;<br>017 NE;<br>Rio Arriba County - Farmington Field Office<br>SANTA FE NATIONAL FOREST | 676.28 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-005 | T.0260N, R.0010E, NM PM, NM<br>Sec. 021 S2NE;<br>022 E2NW, W2W2;<br>Rio Arriba County - Farmington Field Office<br>SANTA FE NATIONAL FOREST | 320 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3C Heritage Resources<br>FS3 (NM) CSU3B Retention Visual Quality Objective |
| NM-201410-006 | T.0210N, R.0010W, NM PM, NM<br>Sec. 002 LOTS 4;<br>002 SWSW;<br>002 SESWNW, NESWSWNW, E2NWSW;<br>002 S2SWNWSW;<br>003 LOTS 7, 10, 11, 15, 18;<br>003 SENENENE, NESENENE;<br>003 SESENESE, S2SESE, NESESE;<br>003 S2NWSESE;<br>010 E2, SENW, E2SW;<br>010 E2NENW, E2W2NENW, SESWNW;<br>010 E2NESWNW, SWNESWNW, | 819.5 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3B Retention Visual Quality Objective<br>FS3 (NM) CSU3C Heritage Resources |

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| | E2NWSW;<br>T.0220N, R.0010W, NM PM, NM<br>Sec. 034 SESESE, S2NESESE, NENESESE;<br>Sandoval County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | | |
| NM-201410-007 | T.0210N, R.0010W, NM PM, NM<br>Sec. 003 LOTS 9;<br>003 SWNWNWNW;<br>T.0220N, R.0010W, NM PM, NM<br>Sec. 025 LOTS 1-4;<br>025 W2E2, W2;<br>026 LOTS 1-7;<br>026 E2E2, NWNE, S2SW, SWSE;<br>027 LOTS 1;<br>027 E2SE, SWSE;<br>034 W2NE, SENW, NWSW;<br>034 NENENE, W2NENE, N2SENENE;<br>034 SWSENENE, W2NESENE, W2SENE;<br>034 NWSESENE, NENENW, E2NWNENW;<br>034 S2NENW, E2SENWNW, E2NESWNW;<br>034 S2SWNW, N2NESW, SWNESW;<br>034 N2SENESW, SWSENESW;<br>034 N2NESWSW, SWNESWSW, W2SWSW;<br>034 NWSESWSW, N2NWSE, NWSWNWSE;<br>036 LOTS 1-4;<br>036 W2E2, W2;<br>Sandoval County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 2311.68 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) NSO-2A Roadless Recreation, Management L<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3B Retention Visual Quality Objective<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-008 | T.0210N, R.0010W, NM PM, NM<br>Sec. 007 LOTS 1-4;<br>007 E2W2;<br>018 LOTS 1-4;<br>018 E2W2, SWSE;<br>019 LOTS 1, 2, 5, 6, 7;<br>019 W2NE, E2NW, NESW;<br>Sandoval County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 1078 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3B Retention Visual Quality Objective<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-009 | T.0220N, R.0010W, NM PM, NM<br>Sec. 001 LOTS 1-7;<br>001 SWNE, S2NW, SW, W2SE;<br>002 LOTS 1-4;<br>002 S2N2, S2;<br>003 LOTS 3, 4;<br>003 S2N2, S2;<br>010 N2, SW;<br>010 W2NWSE, NENWSE, NWNESE;<br>010 N2SENWSE, SWSENWSE;<br>010 N2NENESE, W2SWSE;<br>010 W2E2SWSE, SESESWSE;<br>010 S2SWSESE, NESWSESE;<br>010 SESESE;<br>Sandoval County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 2409.55 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) NSO-2A Roadless Recreation, Management L<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3C Heritage Resources |

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| NM-201410-010 | T.0220N, R.0010W, NM PM, NM<br>Sec. 011 N2, SESW, SE;<br>011 E2NESW, E2W2NESW;<br>011 NWNWNESW, SWSWNESW;<br>011 N2N2NWSW, SESENWSW;<br>011 NESWSW, SENWSWSW;<br>011 S2SWSW;<br>012 LOTS 1-4;<br>012 W2E2, W2;<br>014 E2, N2NW, S2SW;<br>014 NESWNW, NWNWSENW;<br>014 E2NWSENW, NESENW;<br>014 NESWSENW, N2SESENW;<br>014 E2NWSW, NENWNWSW;<br>014 S2NWNWSW, SWNWSW;<br>014 S2NENESW, W2NWNESW;<br>014 SENWNESW, S2NESW;<br>015 N2N2, SWNE, N2S2NW;<br>015 W2SENE, N2SWSWNW;<br>015 SWSWSWNW, NWSESWNW;<br>015 NWNWNWSW;<br>Sandoval County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 2081.62 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) NSO-2A Roadless Recreation, Management L<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-011 | T.0220N, R.0010W, NM PM, NM<br>Sec. 013 LOTS 1-4;<br>013 W2E2, W2;<br>015 S2S2, S2S2N2SE;<br>022 LOTS 1-4;<br>022 N2, N2SW;<br>023 LOTS 1-7;<br>023 N2N2, E2SE;<br>024 LOTS 1-4;<br>024 W2E2, W2;<br>Sandoval County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 2306.52 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) NSO-2A Roadless Recreation, Management L<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-012 | T.0230N, R.0010W, NM PM, NM<br>Sec. 013 S2S2, NWSW, NESE;<br>013 S2S2NESW, NENWSE;<br>013 NWSWNESW, NESENESW;<br>013 SENWNWSE, S2NWSE;<br>023 LOTS 1-4;<br>023 E2, E2W2;<br>024 ALL;<br>Rio Arriba County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 1572.7 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-013 | T.0230N, R.0010W, NM PM, NM<br>Sec. 025 ALL;<br>026 LOTS 5, 8;<br>026 E2, E2NW, NESW;<br>026 NENWNW, E2NWNWNW, E2SENWNW;<br>026 E2NESWNW, NWSWSWNW;<br>026 S2S2SWNW, NESESWNW, E2NWSW;<br>035 LOTS 1-8;<br>035 E2NE, SE;<br>036 ALL;<br>Sandoval County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 2242.62 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3A Riparian Areas and Wetlands<br>FS3 (NM) CSU3C Heritage Resources |

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| NM-201410-014 | T.0240N, R.0010W, NM PM, NM<br>Sec. 017 ALL;<br>018 LOTS 1-4;<br>018 N2NE, E2NW, SE;<br>Rio Arriba County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 1110.52 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) TLS-4 Deer and Elk Winter Range<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-015 | T.0240N, R.0010W, NM PM, NM<br>Sec. 019 LOTS 1-4;<br>019 E2, E2W2;<br>020 ALL;<br>030 LOTS 1-4;<br>030 NE, E2W2, N2SE;<br>Rio Arriba County- Farmington Field Office<br>SANTA FE NATIONAL FOREST | 1823.68 | FS1 (Santa Fe) Secretary of Agriculture Rule<br>And Regulations Compliance<br>FS3 (NM) NSO-1 Steep Slopes<br>FS3 (NM) CSU3C Heritage Resources |
| NM-201410-016 | T.0240N, R.0020W, NM PM, NM<br>Sec. 013 NW;<br>Rio Arriba County- Farmington Field Office<br>Private Surface | 160 | NM-11-LN Special Cultural Resource<br>F-15-POD Plan of Development<br>F-41-LN |
| NM-201410-018 | T.0210N, R.0060W, NM PM, NM<br>Sec. 006 LOTS 6;<br>Sandoval County- Farmington Field Office<br>BIA- Navajo Nation | 39.9 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-44-NSO Community Residence<br>F-41-LN |
| NM-201410-024 | T.0210N, R.0070W, NM PM, NM<br>Sec. 001 SESE;<br>Sandoval County- Farmington Field Office<br>BIA- Navajo Nation | 40 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-44-NSO Community Residence<br>F-41-LN |
| NM-201410-026 | T.0210N, R.0070W, NM PM, NM<br>Sec. 011 E2SE;<br>Sandoval County- Farmington Field Office<br>BIA- Navajo Nation | 80 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-44-NSO Community Residence<br>F-41-LN |
| NM-201410-027 | T.0210N, R.0070W, NM PM, NM<br>Sec. 014 SE;;<br>Sandoval County- Farmington Field Office<br>BIA- Navajo Nation | 160 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-44-NSO Community Residence<br>F-41-LN |
| NM-201410-028 | T.0210N, R.0070W, NM PM, NM<br>Sec. 018 SE;<br>Sandoval County- Farmington Field Office<br>BIA- Navajo Nation | 160 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-44-NSO Community Residence<br>F-41-LN |
| NM-201410-030 | T.0220N, R.0070W, NM PM, NM<br>Sec. 026 SW;<br>Sandoval County- Farmington Field Office<br>BIA- Navajo Nation | 160 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-44-NSO Community Residence<br>F-41-LN |
| NM-201410-031 | T.0220N, R.0070W, NM PM, NM<br>Sec. 034 SE;<br>Sandoval County- Farmington Field Office<br>BIA- Navajo Nation | 160 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-44-NSO Community Residence |

| | | | |
|---|---|---|---|
| | | | F-41-LN |
| NM-201410-034 | T.0300N, R.0150W, NM PM, NM<br>Sec. 011 SESE;<br>012 SENW, SW;<br>014 E2NE;<br>San Juan County- Farmington Field Office<br>Private Surface | 320 | F-15-POD Plan of Development<br>F-41-LN<br>NM-11-LN Special Cultural Resource |
| NM-201410-035 | T.0300N, R.0160W, NM PM, NM<br>Sec. 003 LOTS 1-16;<br>004 LOTS 1-7;<br>004 S2NE, SENW, E2SW, SE;<br>009 LOTS 1-4;<br>009 NE, E2NW, E2SW, SE;<br>010 LOTS 1-2;<br>010 E2NW;<br>San Juan County- Farmington Field Office<br>BIA- Navajo Nation | 1897.86 | BIA-1<br>BIA-3<br>F-15-POD Plan of Development<br>F-41-LN Biological Survey<br>F-46-CSU Topography<br>F-44-NSO Community Residence<br>F-41-LN<br>WO-ESA-7 |
| * See Appendix A for a summary of stipulations | | | |

**Design Features**

- The BLM encourages industry to incorporate and implement "Best Management Practices" (BMPs), which are designed to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. Typical measures include: adherence to BLM's Notice to Lessees' (NTL) 4(a) concerning the venting and flaring of gas on Federal leases for natural gas emissions that cannot be economically recovered, flare hydrocarbon gases at high temperatures in order to reduce emissions of incomplete combustion; water dirt roads during periods of high use in order to reduce fugitive dust emissions; co-locate wells and production facilities to reduce new surface disturbance; implementation of directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores; require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; and perform interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.

- The FFO purchased an infrared camera designed to detect natural gas leaks on and around well pad and pipeline facilities. FFO inspection personnel have been trained to operate the camera and FFO is currently developing a strategy to implement the use of the camera in cooperation with oil and gas operators to detect and eliminate natural gas leaks in well pad and pipeline infrastructure.

- An application for permit to drill (APD) is required for each proposed well to develop a lease. Onshore Oil and Gas Order No. 1 issued under 43 CFR 3160 authorizes BLM to attach Conditions of Approval (COA) to APDs during the permitting process. As a result

of recommendations from the Four Corners Air Quality Task Force, the New Mexico Environment Department, Environmental Protection Division requested FFO attach a COA to APDs requiring new and replacement internal combustion gas field engines of between 40 and 300 horsepower to emit no more than two grams of nitrogen oxides per horsepower-hour. FFO has included a COA limiting nitrogen oxides since August of 2005.

- Required archaeological surveys would be conducted for all subsequent actions that are expected to occur from the lease sale to avoid disturbing cultural resources. No site-specific mitigation measures for cultural resources have been recommended at this time for the proposed parcels recommended to proceed for sale. Specific mitigation measures, including, but not limited to, site avoidance or excavation/data recovery would have to be determined when site-specific development proposals are received. The authorizing agencies (USFS, BIA, BLM) will not approve any ground-disturbing activities that may affect any such properties or resources until those agencies complete their NHPA section 106 obligations. The authorizing agencies may require modification to exploration or development proposals to protect such properties, or won't approve any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.

- In the event that lease development practices are found in the future to have an adverse effect on Native American TCPs, the appropriate authorizing agency , in consultation with the affected tribe, would take action to mitigate or negate those effects. Measures include, but are not limited to physical barriers to protect resources, relocation of practices responsible for the adverse effects, or other treatments as appropriate.

- To be in conformance with the Native American Graves Protection and Repatriation Act of 1991 (Public Law 101-610), the terms and conditions of the lease shall contain the following condition: In the event that the lease holder discovers or becomes aware of the presence of Native American human remains within the lease, they shall immediately notify the appropriate authorizing agency in writing.

- The use of a plastic-lined reserve pits or closed systems or steel tanks; casing and cementing requirements; storm water management, silt traps, site recontouring, timely reseeding of disturbed areas and soil stabilization would be implemented.

- The operator would stockpile the topsoil from the surface of well pads which would be used for interim and final reclamation of the well pads. Reserve pits would be recontoured and reseeded as described in attached Conditions of Approval. Upon abandonment of the wells and/or when access roads are no longer in service the Authorized Officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas as described in the attached Conditions of Approval. During the life of the development, all disturbed areas not needed for active support of production operations should undergo "interim" reclamation in order to minimize the environmental impacts of development on other resources and uses. Site specific mitigations, determined during the onsite, such as proper project placement,

storm water management, silt traps, rounding of corners and soil stabilization, would reduce erosion and sediment migration. Earthwork for interim and final reclamation must be completed within 6 months of well completion or well plugging (weather permitting). The operator shall submit a Sundry Notices and Reports on Wells (Notice of Intent), Form 3160-5, prior to conducting interim reclamation.

- Road constructions requirements and regular maintenance would alleviate potential impacts to access roads from water erosion damage.

- Mitigation would include, as needed to protect impacts to resources, revegetation with native plant species, soil enhancement practices, direct live haul of soil material for seed bank revegetation, reduction of livestock grazing, fencing of reclaimed areas, and the use of seeding strategies consisting of native grasses, forbs, and shrubs.

- In the event noxious weeds are discovered during construction of any access roads and well pads, mitigation would be deferred to the site specific development at the APD stage. Best management practices (BMPs) would be incorporated into the conditions of approval (COAs) of an approved APD.

- A biological survey may be required to determine any impacts on individual project proposals. Any potential impacts to special status species will be determined based on the biological survey report. Site specific stipulations may be attached to reduce impacts to any special status species. These stipulations include (but not limited to) timing stipulations, additional surveys, additional alternatives analyzed (including twinning), and constructions design stipulations.

- All construction activities will be confined to the permitted areas only. Site specific mitigation measures designed to protect migratory birds will be implemented to decrease direct impacts to nesting birds. If an active nest is observed during construction, construction activities that could result in take as defined by the MBTA would halt until practicable or reasonable avoidance alternatives are identified, the birds have fledged, or a migratory bird take permit has been granted from the USFWS. Any proposed action that would result in more than four acres of new surface disturbance; a preconstruction migratory bird nest survey may be required if any construction activities occur between May 15 – July 31 per BLM/FFO Instruction Memorandum No. NM-F00-2010.

- Special painting schemes may be required for all facilities to closely approximate the vegetation within the setting. All facilities, including the meter building, would be painted to blend with the surrounding vegetation. If the proposed project is determined to be in a scenic area, site specific COAs, proper project placement, tree screen, low profile equipment, may be required for the proposed action.

**Reasonably Foreseeable Development**

At the leasing stage, it is uncertain if Applications for Permit to Drill on leased parcels would be received, nor is it known if or to what extent development would occur. Such development may

include constructing a well pad and access road, drilling a well using a conventional pit system or closed-loop system, hydraulically fracturing the well, installing pipelines and/or hauling produced fluids, regularly monitoring the well, and completing work-over tasks throughout the life of the well. In Farmington, typically, all of these actions are undertaken during development of an oil or gas well; it is reasonably foreseeable that they may occur on leased parcels. See Appendix 1 for a complete description of the phases of oil and gas development.

Drilling of wells on a lease would not be permitted until the lease owner or operator secures approval of a drilling permit and a surface use plan as specified under Onshore Oil and Gas Orders (43 CFR 3162). A permit to drill would not be authorized until site-specific NEPA analysis is conducted.

Standard terms and conditions, stipulations listed in the Farmington RMP, and any new stipulations would apply as appropriate to each lease. In addition, site specific mitigation measures and BMPs would be attached as Conditions of Approval (COAs) for each proposed exploration and development activity authorized on a lease.

**Alternatives Considered but Eliminated from Detailed Analysis**

The alternatives considered but eliminated from detailed analysis identify those parcels that are not in conformance with the current land use plans or need more time for evaluation. Therefore this alternative will not be carried through the remainder of this environmental assessment. Table 2: Alternatives Considered but Eliminated from Detailed Analysis identifies those nominated parcels that are not in conformance with current land use plans, and also describes why these parcels were not carried forward into the proposed action. New information obtained in public scoping for this lease sale in regards to Tribal community and residences located within the parcels identified in Table 2 require further coordination with the Tribe. Even though we received consent to lease the parcels from the Bureau of Indian Affairs, we have determined that obtaining this information is essential in making a reasoned choice among alternatives. (BLM Handbook 1790-1 pg. 54)

**Table 2: Alternatives Considered but Eliminated from Detailed Analysis**

| Lease Parcel # | Legal Description | Acres | |
|---|---|---|---|
| NM-201410-017 | T.0210N, R.0060W, NM PM, NM<br>Sec. 005 LOTS 1-3;<br>005 S2NE;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 201.8 | |
| NM-201410-019 | T.0210N, R.0060W, NM PM, NM<br>Sec. 024 W2;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 320 | |

| | | | |
|---|---|---|---|
| NM-201410-020 | T.0210N, R.0060W, NM PM, NM<br>Sec. 031 LOTS 3-4;<br>031 E2SW;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 160.16 | |
| NM-201410-021 | T.0220N, R.0060W, NM PM, NM<br>Sec. 004 SE;<br>005 SW;<br>006 LOTS 6, 7;<br>006 E2SW, SE;<br>008 N2;<br>009 N2, W2SW;<br>010 NW;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 1521.16 | |
| NM-201410-022 | T.0220N, R.0060W, NM PM, NM<br>Sec. 015 SE;<br>022 NENE;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 200 | |
| NM-201410-023 | T.0220N, R.0060W, NM PM, NM<br>Sec. 023 E2;<br>024 NW;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 480 | |
| NM-201410-025 | T.0210N, R.0070W, NM PM, NM<br>Sec. 002 LOTS 1, 2;<br>002 S2NE;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 162.45 | |
| NM-201410-029 | T.0210N, R.0070W, NM PM, NM<br>Sec. 022 SE;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 160 | |
| NM-201410-032 | T.0230N, R.0070W, NM PM, NM<br>Sec. 006 LOTS 5-7;<br>006 SENW, E2SW, SWSE;<br>007 NE;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 441.5 | |
| NM-201410-033 | T.0230N, R.0070W, NM PM, NM<br>Sec. 035 NE;<br>Sandoval County- Farmington Field Office<br>BIA-Navajo Nation | 160 | |

**Introduction**

This section describes the environment that would be affected by implementation of the proposed action or preferred alternative described in Section 2. Elements of the affected environment described in this section focus on the relevant resources and issues.

**Air Resources**

Air quality and climate are components of air resources which may be affected by BLM applications, activities, and resource management. Therefore, the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision making process. Additional information on air quality in this area is contained in Chapter 3 of the Farmington Field Office (FFO) Resource Management Plan (RMP) and Final Environmental Impact Statement (FEIS; USDI BLM, 2003) which this analysis tiers to and incorporates. Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Resources Technical Report) (U.S. Department of Interior Bureau of Land Management, 2014). This document summarizes the technical information related to air resources and climate change associated with oil and gas development and the methodology and assumptions used for analysis.

## Air Quality

The Air Resources Technical Report describes the types of data used for description of the existing conditions of criteria pollutants, how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current National and state standards. EPA's Green Book web page (U.S. Environmental Protection Agency, 2013) reports that all counties in the Farmington Field Office area are in attainment of all National Ambient Air Quality Standards (NAAQS) as defined by the Clean Air Act. The area is also in attainment of all state air quality standards (NMAAQS*). The current status of criteria pollutant levels in the Farmington Field Office are described below. Total emissions of criteria pollutants from each source sector were calculated by adding together the emissions from the four counties that are located in FFO: San Juan, McKinley, Rio Arriba, and Sandoval.*

"Design Concentrations" are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. The 2012 design concentrations of criteria pollutants are listed below in Table 4. There is no monitoring for CO and lead in San Juan County, but because the county is relatively rural, it is likely that these pollutants are not elevated. PM10 design concentrations are not available for San Juan County.

**Table 3. 2012 Criteria Pollutant Monitored Values in San Juan County (U.S. Environmental Protection Agency, 2014)**

| Pollutant | 2012 Design Concentration | Averaging Time | NAAQS | NMAAQS |
|---|---|---|---|---|
| $O_3$ | 0.071 ppm | 8-hour | 0.075 ppm[1] | |
| $NO_2$ | 13 ppb | Annual | 53 ppb[2] | 50 ppb |
| $NO_2$ | 38 ppb | 1-hour | 100 ppb[3] | |
| $PM_{2.5}$ | 4.7 µg/m$^3$ | Annual | 12 µg/m$^3$[3,4] | 60 µg/m$^3$[3,6] |

| | | | | |
|---|---|---|---|---|
| $PM_{2.5}$ | 14 µg/m$^3$ | 24 hour | 35 µg/m$^{3,3}$ | 150 µg/m$^{3,6}$ |
| $SO_2$ | 19 ppb | 1-hour | 75 ppb[5] | |

[1] Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
[2] Not to be exceeded during the year
[3] 98th percentile, averaged over 3 years
[4] Annual mean, averaged over 3 years
[5] 99$^{th}$ percentile of 1-hour daily maximum concentrations, averaged over 3 years
[6] The NMAAQS is for Total Suspended Particulate (TSP)

In 2005, the EPA estimates that there was less than 0.01 ton per square mile of lead emitted in FFO counties, which is less than 2 tons total (U.S. Environmental Protection Agency, 2012). Lead emissions are not an issue in this area, and will not be discussed further.

Air quality in a given region can be measured by its Air Quality Index value. The air quality index (AQI) is reported according to a 500-point scale for each of the major criteria air pollutants, with the worst denominator determining the ranking. For example, if an area has a CO value of 132 on a given day and all other pollutants are below 50, the AQI for that day would be 132. The AQI scale breaks down into six categories: good (AQI<50), moderate (50-100), unhealthy for sensitive groups (100-150), unhealthy (>150), very unhealthy and hazardous. The AQI is a national index, the air quality rating and the associated level of health concern is the same everywhere in the country. The AQI is an important indicator for populations sensitive to air quality changes.

Mean AQI values for San Juan County were generally in the good range (AQI<50) in 2013 with 80% of the days in that range. The median AQI in 2013 was 42, which indicates "good" air quality. The maximum AQI in 2013 was 156, which is "unhealthy".

Although the AQI in the region has reached the level considered unhealthy for sensitive groups on several days almost every year in the last decade, there are no patterns or trends to the occurrences (Table 4). On 8 days in the past decade, air quality has reached the level of "unhealthy" and on two days, air quality reached the level of "very unhealthy". In 2009 and 2012, there were no days that were "unhealthy for sensitive groups" or worse in air quality. In 2005 and 2013, there was one day that was "unhealthy" during each year. In 2010, there were five "unhealthy" days and two "very unhealthy days".

**Table 4. Number of Days classified as "unhealthy for sensitive groups" (AQI 101-150) or worse** (U.S. Environmental Protection Agency, 2013a)

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|
| Days | 3 | 6 | 9 | 18 | 1 | 0 | 12 | 9 | 0 | 1 |

**Hazardous Air Pollutants**

The Air Resources Technical Report discusses the relevance of hazardous air pollutants (HAPs) to oil and gas development and the particular HAPs that are regulated in relation to these activities (U.S. Department of Interior Bureau of Land Management, 2014). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in

the U.S. The purpose of the NATA is to identify areas where HAP emissions result in high health risks and further emissions reduction strategies are necessary. A review of the results of the 2005 NATA shows that cancer, neurological and respiratory risks in San Juan County are generally lower than statewide and national levels as well as those for Bernalillo County where urban sources are concentrated in the Albuquerque area (U.S. Environmental Protection Agency, 2012).

Additional information on air quality in the Forest Service Parcels is contained in the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest 2008 (page 84-94).

**Climate**

The planning area is located in a semiarid climate regime typified by dry windy conditions and limited rainfall. Summer maximum temperatures are generally in the 80s or 90s (Fahrenheit) and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100 $^{o}$F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the Southwest Monsoon and winter snowfall as Pacific weather systems drop south into New Mexico.

**Table 4. 1981-2010 Climate Normals for Chaco Canyon National Monument**

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Precip (inches)** | **0.68** | **0.63** | **0.62** | **0.63** | **0.48** | **0.51** | **1.37** | **1.36** | **1.15** | **0.81** | **0.71** | **0.67** |
| **Min. Temp. (F)** | **13.4** | **19.1** | **23.8** | **30.4** | **38.9** | **47.7** | **55.6** | **53.9** | **45.0** | **32.3** | **21.3** | **14.2** |
| **Avg. Temp. (F)** | **28.5** | **34.1** | **40.9** | **48.5** | **57.8** | **67.0** | **72.7** | **70.4** | **62.6** | **50.2** | **37.9** | **29.1** |
| **Max. Temp. (F)** | **43.6** | **49.1** | **58.0** | **66.7** | **76.7** | **86.3** | **89.8** | **86.9** | **80.3** | **68.1** | **54.5** | **44.0** |

The Air Resources Technical Report summarizes information about greenhouse gas emissions from oil and gas development and their effects on national and global climate conditions. While it is difficult to determine the spatial and temporal variability and change of climatic conditions; what is known is that increasing concentrations of GHGs are likely to accelerate the rate of climate change.

**Heritage Resources**

**Cultural Resources**

The nominated parcels are located within and on the margins of the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the prehistory of the San Juan Basin can be

divided into five major periods: PaleoIndian (ca. 10000 B.C. to 5500 B.C.), Archaic (ca. 5500 B.C. to A.D. 400), Basketmaker II-III and Pueblo I-IV periods (A.D. 1-1540), and the Historic (A.D. 1540 to present), which includes Native American as well as later Hispanic and Euro-American settlers. Detailed description of these various periods and select phases within each period is provided in the Bureau of Land Management Farmington Field Office Final Environmental Impact Statement and Resource Management Plan (2003) and will not be reiterated here. Additional information is also included in an associated document (SAIC 2002).

BLM Manual 8100, *The Foundations for Managing Cultural Resources* (2004) defines a cultural resource as "*a definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups. (cf. "traditional cultural property"). Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing for public benefit described in this Manual series. They may be but are not necessarily eligible for the National Register* (a.k.a. "historic property"). While the USFS and Navajo Nation have their own operational definitions regarding cultural resources on their lands, the preceding definition is generally applicable. On the Navajo Nation cultural resources are managed for the benefit of the Navajo Nation and its people, not the public.

Section 106 of the National Historic Preservation Act requires federal agencies to consider what effect their licensing, permitting, or otherwise authorizing of an undertaking, such as mineral leasing, may have on properties eligible for the National Register. Pursuant to 36 CFR 800.16 (i), "*Effect means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register*."

The National Register of Historic Places (36 CFR Part 60) is the basic benchmark by which the significance of cultural resources are evaluated by a federal agency when considering what effects its actions may have on cultural resources. To summarize, to be considered eligible for the National Register a cultural resource must have integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the following criteria: *a*) are associated with events that have significantly contributed to the broad patterns of our history; or *b*) are associated with the lives of persons significant in our past; or *c*) embody distinctive characteristics of the type, period, or method of construction, or represents the work of a master, or possesses high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; or *d*) have yielded, or maybe likely to yield, information is important in a pre-history or history.

Cultural resources vary considerably and may include but are not limited to simple artifact scatters, domiciles of various types with a myriad of associated features, rock art and inscriptions, ceremonial/religious features, and roads and trails. In the broadest sense cultural resources include sites, buildings, structures, objects, and districts/landscapes (NPS 1997).

- A "site" is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archeological value regardless of the value of any existing structure. A site need not be marked by physical remains if it is the location of a prehistoric or historic event or pattern of events and if no buildings, structures, or objects marked it at the time of the events.
- A "building" is created principally to shelter any form of human activity. "Building" may also be used to refer to a historically and functionally related unit, such as a courthouse and jail or a house and barn. If a building has lost any of its basic structural elements, it is usually considered a "ruin" and is categorized as a site.
- The term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter. If a structure has lost its historic configuration or pattern of organization through deterioration or demolition, it is usually considered a "ruin" and is categorized as a site.
- The term "object" is used to distinguish from buildings and structures those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed. Although it may be, by nature or design, movable, an object is associated with a specific setting or environment.
- A "district" possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development. A district can contain buildings, structures, sites, objects, or open spaces that do not contribute to the significance of the district. A district can also be a grouping of archeological sites related primarily by their common components; these types of districts often will not visually represent a specific historic environment. In archeological districts, the primary factor to be considered is the effect of any disturbances on the information potential of the district as a whole.

**Cultural Landscapes**

Cultural landscapes "*represent the 'combined works of nature and of man'... [and] are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal*" (UNESCO 2008). The term embraces a diversity of manifestations of the interaction between humans and the natural environment and often reflects specific techniques of sustainable land use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. UNESCO (2008) further defined cultural landscapes as falling into three main categories

1. *Designed and created intentionally by man*. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.
2. *Organically evolved*. This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. They fall into two sub-categories:

a. A relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.
b. Continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.

3. *Associative cultural landscape*. Such landscapes are defined by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

The National Park Service has defined cultural landscapes as "*a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values*" (Birnbaum 1994; Birnbaum and Peters 1996). Under National Park Service guidance cultural landscapes have four definitions that are not mutually exclusive.

1. *Historic Designed Landscape*. A landscape that was consciously designed or laid out by a landscape architect, master gardener, architect, or horticulturist according to design principles, or an amateur gardener working in a recognized style or tradition.
2. *Historic Vernacular Landscape* - a landscape that evolved through use by the people whose activities or occupancy shaped that landscape.
3. *Historic Site* - a landscape significant for its association with a historic event, activity, or person.
4. *Ethnographic Landscape* - a landscape containing a variety of natural and cultural resources that associated people define as heritage resources.

Landscape characteristics are the tangible evidence of the activities and habits of the people who occupied, developed, used, and shaped the land to serve human needs and they may reflect the beliefs, attitudes, traditions, and values of these people. There is no comprehensive guidance on what characteristics to evaluate with regards to the landscape, or how to "read a landscape" (Birnbaum 1994). Whatever approach is taken should provide a broad overview. The National Park Service (1999; Birnbaum and Peters 1996) has offered a number of character defining features and organizational elements that should be examined when considering human use or activity in a geographic area for cultural landscapes:

1. Land uses and activities
2. Patterns of spatial organization
3. Response to the natural environment
4. Cultural traditions
5. Circulation networks (e.g. roads, paths)
6. Topography
7. Water features
8. Boundary demarcations
9. Vegetation related to land use
10. Buildings, structures, and objects
11. Clusters
12. Archaeological sites
13. Small-scale elements.

Zvelebil et al. (1992) identified seven major problems associated with landscape approaches to archaeological remains. To summarize, they include 1) lack of chronological resolution, 2) the palimpsest effect, 3) definition of a regional scale, 4) biases introduced through taphonomic

processes, 5) variation over the landscape, 6) paleoenvironmental reconstruction, and 7) modern land use. Van Dyke (2007:8, 39) observed that "*the contemporary archaeological landscape is but a distorted remnant of the ancient landscape, and interpretations of both are and were culturally situated*" and that "*past landscapes no longer exist*." Compounding the difficulty in defining landscapes is that they may be a composite of designed and vernacular/organic characteristics and at the same time represents a relic or fossil landscape to some and a continuing ethnographic/associative landscape to others.

A cultural landscape is also one of the categories of property qualifying for listing in the National Register as a historic site or district. A district (e.g. landscape) must be a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, style of sites, buildings, structures, and objects, or by documented differences in patterns of historic development or associations. It is seldom defined, however, by the limits of current parcels of ownership, management, or planning boundaries. The boundaries must be based upon *shared relationship* among the properties constituting the district. A district is usually a single geographic area of contiguous historic properties; however, a district can also be composed of two or more definable significant areas separated by nonsignificant areas. Clement (1999:17) advised that "*As a general rule, it is preferable to identify a reasonably defensible smaller landscape rather than stretching boundaries to distant horizons, and perhaps threatening the credibility of the process*."

Landscapes can be read on many levels: landscape as nature, habitat, artifact, system, problem, wealth, ideology, history, place and aesthetic. A single landscape approach does not exist (Clark and Scheiber 2008; Van Dyke 2007). When developing a strategy to document a cultural landscape, it is important to attempt to read the landscape in its context of place and time (Birnbaum 1994). Within the Farmington Field Office there is an abundance of cultural resources representative of numerous cultural traditions that are spatially and temporally discrete and diffuse. These resources most assuredly represent a multitude of distinct and overlapping cultural landscapes.

*Area of Potential Affect and Cultural Resource Identification*

As previously noted, pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR Part 800) a federal agency is required to consider the effects of its actions or "undertakings", such as leasing, on properties that are listed or eligible for the National Register of Historic Places. This is completed by a process of collaborative identification, normally including field surveys of some kind with subsequent evaluations of significance for any districts, sites, buildings, structures, and objects that have been identified within the Area of Potential Effect (APE).

Pursuant to 36 CFR Part 800.4(a) and 800.4(b), BLM has consulted with the New Mexico SHPO, the National Park Service (Chaco Culture National Historical Park and National Trails Intermountain Region), Navajo Nation and seven potentially affected chapters (Nageezi, Counselor, Hogback, Nenahnezad/San Juan, Upper Fruitland, Ojo Encino, Torreon, and Pueblo Pintado), Jicarilla Apache Nation, Ute Mountain Ute Tribe, Southern Ute Tribe, the pueblos of Zia, Zuni, Jemez, Acoma, and Hopi, and the National Trust for Historic Preservation, the Chaco

Alliance, and the Old Spanish Trail Association (OSTA). They were advised that the BLM was considering the parcels as the APE and were inviting them to help identify cultural resources within the nominated parcels. Only the SHPO, OSTA, and the Hopi responded. No objection to the APE was raised.

The New Mexico SHPO (April 10, 2014) indicated that some of the surveys in the eastern area would need to be evaluated for thoroughness and standards. SHPO also pointed out the proximity of the Pueblo Pintado site to some of the parcels and indicated that they would provide more comments after BLM completed its cultural review. OSTA (March 24, 2014) identified concerns with the visual and auditory impact of development on the setting of the OST and recommended that BLM conduct a viewshed analysis and establish inventory observation points. The Hopi (March 25, 2014) requested a cultural resources overview for review and comment.

Pursuant to 36 CFR 800.16(d) BLM has identified two levels of APE for this undertaking: 1) the lease parcel themselves for undertakings that could affect aspects of a historic properties physical integrity including location, design, materials, and workmanship; and 2) a viewshed area corresponding to the "foreground/middle ground" (≤ 5 mi) (BLM Handbook H-8410) from the Old Spanish Trail for related undertakings that could not only affect physical integrity but also a historic properties integrity of setting, feeling, and association.

Identification of cultural resources within the nominated parcels involved use of computerized cultural resources data maintained by the New Mexico Cultural Resource Information System (NMCRIS; April 2014), BLM site location maps, ethnographic records from previously conducted small and large scale cultural resource surveys and ongoing consultation, General Land Office (GLO) records, and assorted published and unpublished records.

*NMCRIS Data*

Previous (1974-2014) cultural resource studies and surveys (n=128) in the nominated lease areas have been generally limited to inventories related to various land use authorizations that include various public and industrial infrastructure, ranching, energy/resources extraction. From the NMCRIS data review, there are 110 archaeological sites on record in the 25 nominated parcels (

Table 5) and approximately 7,464 acres of that acreage (32%) has been inventoried for cultural resources. The figures may be slightly higher, particularly on Navajo surface, because not all known surveys have been electronically captured in a GIS environment. The majority of sites are located on the eastern parcels. While there is likely to be some variation in thoroughness and quality amongst surveys conducted over 40 years, the results are probably a reasonable approximation of what can be expected by future surveys.

**Table 5. Archaeological Survey, Sites, and TCPs on Record**

| Parc | Surfac | Acre | Survey (a | % Surveye | Site | TCPs |
|---|---|---|---|---|---|---|
| 1 | USFS | 1035 | 254 | 24.5% | 31 | none known/identified |
| 2 | Fee | 160 | 0 | 0.1% | 8 | none known/identified |
| 3 | Fee | 200 | 0 | 0.0% | 2 | none known/identified |
| 4 | USFS | 676 | 96 | 14.2% | 2 | none known/identified |
| 5 | USFS | 320 | 58 | 18.0% | 8 | none known/identified |
| 6 | USFS | 820 | 149 | 18.1% | 4 | none known/identified |
| 7 | USFS | 2312 | 1285 | 55.6% | 0 | none known/identified |
| 8 | USFS | 1078 | 360 | 33.4% | 4 | none known/identified |
| 9 | USFS | 2410 | 947 | 39.3% | 2 | none known/identified |
| 10 | USFS | 2082 | 793 | 38.1% | 1 | none known/identified |
| 11 | USFS | 2307 | 1497 | 64.9% | 2 | none known/identified |
| 12 | USFS | 1573 | 853 | 54.2% | 16 | none known/identified |
| 13 | USFS | 2243 | 543 | 24.2% | 3 | none known/identified |
| 14 | USFS | 1111 | 134 | 12.0% | 3 | none known/identified |
| 15 | USFS | 1824 | 270 | 14.8% | 17 | none known/identified |
| 16 | Fee | 160 | 3 | 1.9% | 0 | none known/identified |
| 18 | Navajo | 40 | 7 | 17.8% | 0 | plant gathering area |
| 24 | Navajo | 40 | 0 | 0.0% | 0 | none known/identified |
| 26 | Navajo | 80 | 79 | 98.8% | 2 | none known/identified |
| 27 | Navajo | 160 | 7 | 4.4% | 1 | none known/identified |
| 28 | Navajo | 160 | 43 | 26.9% | 0 | none known/identified |
| 30 | Navajo | 160 | 0 | 0.0% | 0 | Homesite/Ceremonial |
| 31 | Navajo | 160 | 0 | 0.0% | 0 | none known/identified |
| 34 | Fee | 320 | 16 | 5.0% | 1 | none known/identified |
| 35 | Navajo | 1898 | 73 | 3.8% | 3 | none known/identified |
| | TOTAL | 23325 | 7465 | 32.0% | 110 | |

There are 111 distinct cultural/temporal components represented by the sites. The "Unknown" most likely indicates an absence of culturally or temporally diagnostic artifacts or features, such as a scatter of stone tool debris without any diagnostic specimens, or may represent an absence of data in the record. The majority of these unknown sites are likely to be Native American and probably pre-Columbian in age.

Table 6. Cultural Components in the Parcels

| Culture Designation | Count |
|---|---|
| Hispanic | 8 |
| Anglo | 4 |
| Mogollon | 2 |
| Archaic | 2 |
| Unknown | 5 |
| Navajo | 4 |
| Anasazi | 86 |
| **Total** | **111** |

Within the parcels there are no less than 217 features represented at 88 sites. These features are shown in Table 7.

**Table 7. Distribution of Recorded Features in the parcels by Type**

| NMCRIS Code | Type | Count |
|---|---|---|
| 104 | Cliff dwelling | 1 |
| 105 | Dugout | 2 |
| 109 | Hogan | 2 |
| 111 | House foundation | 1 |
| 112 | Isolated room | 36 |
| 116 | Milled lumber structure | 1 |
| 119 | Pithouse | 42 |
| 120 | Ramada / Shelter | 1 |
| 121 | Roomblock | 11 |
| 126 | Tent base | 1 |
| 128 | Tower | 1 |
| 131 | Wall | 11 |
| 203 | Bin / Cist | 5 |
| 205 | Depression | 8 |
| 208 | Midden | 2 |
| 209 | Mound | 12 |
| 211 | Stockade | 1 |

| NMCRIS Code | Type | Count |
|---|---|---|
| 212 | Stone circle | 1 |
| 213 | Rock alignment, undefined | 13 |
| 304 | Charcoal stain | 1 |
| 306 | Hearth | 18 |
| 313 | Roasting pit | 3 |
| 401 | Irrigation ditch / system | 1 |
| 403 | Corral | 5 |
| 404 | Garden plot / Grid garden | 1 |
| 408 | Soil control structure | 4 |
| 501 | Bridge | 17 |
| 504 | Road / Trail | 2 |
| 603 | Mine shaft/tunnel | 1 |
| 705 | Water control device | 1 |
| 801 | Burial / Grave | 6 |
| 904 | Petroglyph | 1 |
| 908 | Shrine | 1 |
| 910 | Wood concentration | 3 |

Some of these features are particular to the pre-Columbian resources of the APE, such as pit house, midden, and roomblock. Others are restricted to the historic periods of occupation such as hogan, corral, bridge etc. Some features such as hearth and charcoal stains may appear at sites of any age and cultural affiliation. The majority of Native American structural sites (e.g. isolated rooms, roomblocks, pithouses, mounds) are in parcels at the eastern margin of the sale area. A complete description of what these features represent may be found in the NMCRIS Users Guide available online at http://www.nmhistoricpreservation.org/arms.html.

*General Land Office (GLO) Records*

Original GLO maps covering the APEs were downloaded from the publicly available http://www.glorecords.blm.gov/ and geo-referenced into a GIS map project. Those maps cover a period from1882-1915. Within the parcel level APE a small number of residences (3) were identified by the GLO surveyors ("Jim Young", "Donaciano Maestez", " F. Olgin"). Fence lines, roads/trails, ditches, corral, and water tank were also identified. No historic features were identified in 1882 on the Navajo parcels. Whether this accurately reflects a low resident population density in the early 1880s, or reflects a bias to documenting non-Native American residential features is uncertain. No prehistoric structural sites were identified on the maps within the parcels. Within the OST APE there are additional residences and ranching related features, roads, and "ruins"/"ancient mounds." Nothing related to the period of significance for the OST was apparent in the GLO records.

| Parcel | Surface | GLO Maps | GLO Maps Sites |
|---|---|---|---|
| 1 | USFS | 1918 | roads, Julian D. C. Chaves patent, |
| 2 | Fee | 1918 | fence |
| 3 | Fee | 1918 | F.Olgin patent and house/ranch |
| 4 | USFS | 1918 | roads to Gallina and El Vado |
| 5 | USFS | 1918 | road |
| 6 | USFS | 1910, 1913 | roads |
| 7 | USFS | 1910, 1913 | ditches, Los Pinos to La Jara road, wagon road |
| 8 | USFS | 1910 | roads |
| 9 | USFS | 1913 | corral; ditches, fence; trails |
| 10 | USFS | 1913 | trails; fence |
| 11 | USFS | 1913 | trails |
| 12 | USFS | 1913 | Cuba to Gallina road; Donaciano Maestez ranch/home; "Mountainous and Non-agricultural"-sec 23 and 24 |
| 13 | USFS | 1913 | "Mountainous and Non-agricultural"-all |
| 14 | USFS | 1917 | corral; tank |
| 15 | USFS | 1917 | Gallina to Largo road |
| 16 | Fee | 1917 | Cuba to Gabilan Lake road |

| | | | |
|---|---|---|---|
| 34 | Fee | 1910 | Jim Young ranch (sec 11); Jewett road; trail |
| 35 | Navajo | 1910 | none; "Non-agricultural land " |

**Native American Religious Concerns**

There are several pieces of legislation or Executive Orders that are considered when evaluating Native American religious concerns. These govern the protection, access and use of scared sites, possession of sacred items, protection and treatment of human remains, and the protection of archaeological resources ascribed with religious or historic importance. These include the following:

- The American Indian Religious Freedom Act of 1978 (AIRFA; 42 USC 1996, P.L. 95-431 Stat. 469).
    - Possession of sacred items, performance of ceremonies, access to sites
- Executive Order 13007 (24 May 1996).
    - Access and use of sacred sites, integrity of sacred sites
- The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001, P.L. 101-601).
    - Protection, ownership, and disposition of human remains, associated funerary objects, unassociated funerary objects, sacred objects, or objects of cultural patrimony
- The Archaeological Resources Protection Act of 1979 (ARPA; 16 USC 470, Public Law 96-95).
    - Protection or archaeological resources on Federal and Indian lands

Traditional Cultural Properties (TCPs; Parker and King 1998) is a term that has emerged in historic preservation management and the consideration of Native American traditional concerns. TCPs are places that are eligible for the National Register of Historic Places and have cultural values, often sacred, that transcend for instance the values of scientific importance that are normally ascribed to cultural resources such as archaeological sites and may or may not coincide with archaeological sites. Native American communities are most likely to identify TCPs, although TCPs are not restricted to those associations. Some TCPs are well known, while others may only be known to a small group of traditional practitioners, or otherwise only vaguely known. Native American tribal perspectives on what is considered a TCP are not limited by a places National Register eligibility or lack thereof.

The identification of places of traditional religious and cultural importance (e.g. TCPs) within or near the APEs has been ongoing for decades. Most but not all of these efforts at identification were linked to land use planning efforts as well as evaluating potential energy extraction (e.g., coal, oil and gas) in the area (e.g. Brugge 1986; Condie et al. 1982; Fransted and Werner 1975; Fransted 1979; Kelly et al. 2006; York and Winter 1988; Van Valkenburgh 1941, Van Valkenburgh 1974). Identification of TCPs for the proposed action was limited to reviewing these existing published and unpublished literature, and ongoing BLM tribal consultation efforts with tribes and local Navajo chapters/communities.

In both the published and gray literature the known places of traditional religious and cultural importance in the San Juan Basin is heavily weighted towards places of Navajo knowledge. This most likely is a byproduct of ongoing and historic occupancy of the area and retention of knowledge pertaining to that area. For example Brugge (1993:54) notes that in a research area of approximately 810 mi.² with very minimal Navajo occupancy around Navajo Reservoir, Gobernador and Largo Canyons, only 66 place names and localities of Navajo use and knowledge had been recorded in the literature or otherwise identified by fieldwork. With over 200 place names and localities identified in a 540 mi.² area around Chaco Canyon with significant Navajo occupation (Fransted and Werner 1975), it's clear that occupancy is an important factor in the retention of specific knowledge.

In the same area reported by Brugge (1993) there was only one specific geographical location identified through extensive and generally unproductive efforts to engage 20 pueblos in identifying and documenting places of traditional religious and cultural importance. Places like Mesa Verde, Chaco Canyon, and Aztec Ruin were often mentioned, and the precise location of a number of other named places generally attributed to northwest New Mexico remains uncertain (Brugge 1993:111). Whether or not these unproductive results indicate an absence of information, a lack of interest in the area, or polite way of safeguarding sensitive information is unknown. Without a doubt the pre-Columbian archaeological sites of the San Juan Basin and elsewhere are culturally affiliated with several pueblos (e.g. Acoma, Zuni, Hopi) and representatives from those pueblos have made it very clear that those sites and their environment are of traditional religious and cultural importance to them.

Based on a review of the available data there appears to be only two locations, both on Navajo parcels, that have been otherwise ascribed traditional religious and cultural importance within the APE: plant and mineral gathering area (parcel NM-201410-018; ceremonial grounds (parcel NM-201410-030).

**World Heritage Sites**

Chaco Culture NHP, Aztec Ruins National Monument, and the BLM managed Chaco outlier sites of Pierre's, Halfway House, Twin Angels, Casamero, and Kin Nizhoni were named as United National Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Sites on December 8, 1987. The World Heritage listing includes the 34,000 acres in Chaco Canyon NHP, 318 acres in Aztec Ruins National Monument, and 518 acres within the five sites managed by the BLM.

None of the parcels are physically within 5 miles of any World Heritage Site and based on a viewshed analysis, none are visible within 0-15 miles (foreground/middleground/background). All the Navajo parcels are approximately 5.5 – 11.5 miles from the Pueblo Pintado unit of Chaco Culture NHP.

**Old Spanish National Historic Trail**

On November 6, 1829 Santa Fe merchant Antonio Armijo led 30-60 men and pack mules on an 86 day journey from Abiquiu to San Gabriel Mission. Armijo's journal (Hafen and Armijo 1947)

indicates that he passed through this area November 10-11. He left San Gabriel Mission on March 1, 1830 following the same route, arriving home on April 25, 1830, having completed the first round trip trade caravan between New Mexico and California. Armijo apparently used this route only once, and subsequently routes farther to the north took precedence.

The Old Spanish Trail (OST) was designated in 2002 as a National Historic Trail and is jointly managed by the BLM and NPS. The OST is a term used largely after the period of significant use and the name Spanish Trail is attributed to John C. Fremont in 1845 and presumably takes its name from the Spanish colonies in northern New Mexico and southern California that were economically linked by this rugged route. During the period of significance (1829-1847) the trail went by the name El Camino de California and El Camino de Nuevo Mexico (Merlin, Marshall, Roney 2011:6).

Approximately 1 mile north of parcel NM-201410-012 lays the legislatively designated "Armijo Route" of the OST. Physical evidence of this route within the vicinity of the lease sale has not been verified on the ground. Within the OST APE there are historic residences and ranching related features, roads, and "ruins"/"ancient mounds" identified in GLO records. Nothing related to the period of significance for the OST was apparent in those records. At the moment a comprehensive BLM/NPS management plan for the trail has not been completed and it not known if this portion the OST will be identified as a high potential trail segment.

**Dark Skies**

There is a long history of stargazing, starting with the Ancestral Puebloan culture that inhabited the Chaco area. There has been focus of substantial research in cultural astronomy, and there are multiple examples where manmade and natural features were used to mark the positions of the sun, moon, and other astronomical phenomena. For the past two decades, Chaco Culture NHP has partnered with the astronomy community. Amateur astronomers regularly host stargazing events under the guidance of a park ranger with a background in archeoastronomy. The park built a public observatory in 1998 to help accommodate the hundreds of thousands of visitors who have enjoyed the night sky at the park. The modern connection with the night sky is a substantial recreation interest and a way for the public to connect and better understand the ancient culture that once thrived in the canyon.

**Water Resources**

The primary aquifers in the BLM/FFO area are the sandstone based Uinta-Animas and the Mesaverde. Figure 3 shows the geologic time column that relates to aquifers in the San Juan Basin. The Uinta-Animas aquifer is composed primarily of Lower Tertiary rocks consisting of the San Jose Formation, the underlying Animas Formation and its lateral equivalent, the Nacimiento Formation, and the Ojo Alamo Sandstone. The aquifer thickness generally increases toward the central part of the basin.

The Mesaverde aquifer comprises water-yielding units in the Upper Cretaceous Mesaverde Group and some adjacent Tertiary and Upper cretaceous formations. In the basin, the aquifer consists of sandstone, coal, siltstone, and shale of the Mesaverde Group. The aquifer has a maximum thickness of about 4,500 feet in the southern part of the basin. The quality of the Mesa

Verde Aquifer is extremely variable. Sparse data indicate that the total dissolved solids (TDS) concentrations ranges from about 1,000 to 4,000 milligrams per liter (mg/L) in the basin (USDI/BLM 2003*a*, page 3-29) and also high in chlorides (USGS 1995). The available data in the San Juan Basin indicate recharge in the area of the Zuni Uplift, Chuska Mountains, and in northern Sandoval County, New Mexico. Transmissivity, the rate which groundwater flows horizontally through an aquifer, of the Mesaverde aquifer is less than 50 square feet per day in large areas of the Colorado Plateaus (USGS 1995).

**Figure 3: Geologic Time Column of the San Juan Basin**

| Era | System | | Formation | Thickness | Production |
|---|---|---|---|---|---|
| CENOZOIC | TERTIARY | | San Jose Formation | 2500 ft. | Gas |
| | | | Nacimiento Formation | 500-1300 ft. | Gas |
| | | | Ojo Alamo Sandstone | 250 ft. | Gas |
| MESOZOIC | CRETACEOUS | | Kirtland Shale / Farmington Sandstone | 1500 ft. | Gas/Oil |
| | | | Fruitland Formation | 500 ft. | Gas |
| | | | Pictured Cliffs Sandstone | 250 ft. | Gas |
| | | | Lewis Shale / Huerfanito Bentonite | 500-1900 ft. | Gas |
| | | Mesaverde Group | Cliff House Sandstone | 0-800 ft. | Gas |
| | | | Menefee Formation | 350-2200 ft. | Gas |
| | | | Point Lookout Formation | 100-300 ft. | Gas |
| | | Mancos Shale | Upper Mancos Shale/Tocito Sandstone | 2300-2500 ft. | Gas/Oil |
| | | | Gallup Sandstone/Carlile Shale | | Gas/Oil |
| | | | Greenhorn Limestone | | |
| | | | Graneros Shale | | |
| | | | Dakota Sandstone | 150-200 ft. | Gas/Oil |
| | JURASSIC | | Morrison Formation | 400-900 ft. | |
| | | | Wanakah Formation / Todilto Limestone | 50-200 ft. | |
| | | | Entrada Sandstone | 100-300 ft. | Oil |
| | TRIASSIC | | Chinle Formation | 500-1600 ft. | |
| PALEOZOIC | PERMIAN | | Cutler Formation | 1500-2500 ft. | |
| | PENNSYLVANIAN | Hermosa Formation | Honaker Trail Formation | | |
| | | | Paradox Formation | 200-3000 ft. | Gas? |
| | | | Pinkerton Trail Formation | | |
| | | | Molas Formation | 0-100 ft. | |
| | MISSISSIPPIAN | | Leadville Limestone | 0-165 ft. | |
| | DEVONIAN | | Elbert Formation | 0-325 ft. | |
| | CAMBRIAN | | Ignacio Quartzite | 0-100 ft. | |
| PRECAMBRIAN | | | | | |

Source: USDI/BLM 2003a

Groundwater is readily available in most of the FFO planning area and is of fair to poor quality. Generally TDS exceed 1,000 mg/L and ranges from 400 up to 4,000 mg/L. The water is hard to very hard with chemical composition dependent on location of withdrawal and the producing aquifer. Calcium or sodium is usually the predominant cation with bicarbonate or sulfate the predominant anion (USDI/BLM 2003*a*, page 3-30).

Most onshore produced water (water that is produced along with oil or gas from target formations) is injected deep underground for either enhanced recovery or disposal. With the passage of the Safe Drinking Water Act in 1974, the subsurface injection of fluids came under federal regulation. In 1980, the USEPA promulgated the Underground Injection Control regulations. The program is designed to protect underground sources of drinking water. The NMOCD regulates oil and gas operations in New Mexico. The NMOCD has the responsibility to

gather oil and gas production data, permit new wells, establish pool rules and oil and gas allowables, issue discharge permits, enforce rules and regulations of the division, monitor underground injection wells, and ensure that abandoned wells are properly plugged and the land is responsibly restored. The New Mexico Environment Department (NMED) administers the major environmental protection laws. The Water Quality Control Commission (WQCC), which is administratively attached to the NMED, assigns responsibility for administering its regulations to constituent agencies, including the NMOCD. The NMOCD administers, through delegation by the WQCC, all Water Quality Act regulations pertaining to surface and groundwater (except sewage not present in a combined waste stream). According to the NMOCD, produced water if predictable in salt concentration, can be used for drilling and completion and possibly cementing (Jones, pers. comm. 2012).

According to NMED data, there are no drinking water sources located in or near the proposed parcels. Wells registered with the NM Office of the State Engineer (OSE) are located in and near parcel -171, but these wells appear to be associated with coal exploration. A domestic water well registered with NMOSE is located between parcels -167 and -156. A few other wells located in or near the nominated parcels are described as being used either for livestock, wildlife, or oil and gas use. All of the nominated parcels are located in the San Juan declared ground water basin.

Additional information on water resources in the Forest Service Parcels is contained in the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest 2008 (page 76-84).

**Fragile Soils**

Fragile soils have a high erosion risk due to a combination of soil erodibility characteristics, slope length, and slope gradient. FFO reviewed Natural Resource Conservation Service (NRCS) soil surveys and has identified three soil types in San Juan County (BA, GY, and RT) and three soil types in Rio Arriba County (9, 10, and 220) that are potentially fragile depending on the percent of slope. The proposed and preferred parcels in Table 8 display the fragile soil type if it is present.

**Table 8. Soil Types**

| Lease Parcel # | Fragile Soil Type | Fragile Soil Acres | Total Acres |
|---|---|---|---|
| NM-201410-035 | Badland | 620 | 1897.86 |

BA Badland

The Badland soil type consists of non-stony barren shale uplands that are dissected by deep intermittent drainages and gullies, and is located on slopes ranging from 5 to 80 percent. The badland soils do not support vegetation in significant quantities, but can be utilized by wildlife.

Additional information on soil resources in the Forest Service Parcels is contained in the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest 2008 (page 66-76).

**Special Status Species**

## USFWS Threatened or Endangered Species

Under Section 7 of the Endangered Species Act of 1973 (as amended), the BLM is required to consult with the U.S. Fish and Wildlife Service (USFWS) on any proposed action which may affect federal listed threatened or endangered species or species proposed for listing. Based on FFO's field inspection and reviews, it was determined that there are no known threatened or endangered species located within the area of analysis. The proposed action would not be in compliance with the 2002 Biological Assessment for the 2003 BLM/FFO RMP (Cons. #2-22-01-I-389). Consultation with USFWS under the Endangered Species Act may be required for any new ground disturbing activity. Any proposed project within the proposed leases would require new effects determination on federally-listed species to ensure any proposed project does not contribute to the demise of the listed species or their habitat.. Table 9 lists all the federally-listed and Candidate species in San Juan, Rio Arriba and Sandoval Counties.

**Table 9. Habitat Descriptions and Presence of Federally-Listed Threatened, Endangered, and Candidate Species in San Juan, Rio Arriba and Sandoval Counties.**

| Species Name | Conservation Status | Habitat Associations | Potential to Occur in the Proposed Action Area |
|---|---|---|---|
| **BIRDS** | | | |
| Southwestern willow flycatcher (*Empidonax traillii extimus*) | Federal-Endangered | Riparian habitats along rivers, streams, or other wetlands with dense growths of willows or other shrubs and medium sized trees. | There are no riparian habitats suitable for willow flycatchers in the proposed action area. |
| Mexican spotted owl (*Strix occidentalis lucida*) | Federal-Endangered | Mature montane forest and in shaded, woody, and steep canyons. | No montane forests are located within the proposed action area. |
| Yellow-billed cuckoo *(Coccyzus americanus*) | Proposed-Threatened | Low to mid-elevation riparian woodlands, deciduous woodlands, and abandoned farms and orchards. | There are no large cottonwood galleries in, or near the proposed action area. |
| Whooping crane (*Grus americana*) | Experimental, non-essential population; Rocky Mountain population | Nests at shallow diatom ponds that contain bulrush. Migration: wetland mosaics most suitable. Feeding: primarily use shallow, seasonally and semi permanently flooded palustrine wetlands for roosting, and various cropland and emergent wetlands. | No suitable wet areas or cropland occur in or near the analysis area. Rocky Mountain experimental population has been discontinued. |
| Least tern-interior pop. (*Sterna antillarum)* | Federal-Endangered | Breeds on sandbars or sandy shorelines along perennial rivers, lakes, and reservoirs east of the | There are no perennial water bodies |

| | | | |
|---|---|---|---|
| | | Continental Divide and forages over open waters. | in the proposed action area. |
| **FISH** | | | |
| Colorado pikeminnow (*Ptychocheilus lucius*) | Federal-Endangered | Large rivers with strong currents, deep pools, and quiet backwaters. | USFWS designated critical habitat within one mile of Parcel #73. |
| Razorback sucker (*Xyrauchen texanus*) | Federal-Endangered | Habitats include slow areas, backwaters and eddies of medium to large rivers; impoundments. | Habitat within one mile of Parcel #73. |
| Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) | Federal-Candidate | Small streams and Lakes at High Elevations 7500-10750 feet in elevation | There are no perennial high elevation streams or lakes within the proposed action area. |
| Rio Grande silvery minnow (*Hybognathus amarus*) | Federal-Endangered | River with silty substrates in eddies, and backwaters of the Rio Grande River and its tributaries. | There are no perennial rivers with eddies and backwaters located in the proposed action area. |
| Roundtail chub (*Gila robusta*) | Federal-Candidate | Occurs in cool to warm water, mid-elevation streams and rivers with deep pools adjacent to swifter riffles and runs. Cover is usually present (large boulders, tree rootwads, submerged large trees, etc.) | Proposed action area does not contain suitable habitat. |
| **MAMMAL** | | | |
| Black footed ferret (*Mustela nigripes*) | Federal-Endangered | Grassland plains where it occurs in association with prairie dogs. At a minimum, the black-footed ferret requires prairie dog towns of at least 80 acres for suitable habitat. | No prairie dog colonies are located within the proposed action area. |
| New Mexico jumping mouse (*Zapus hudsonius luteus)* | Proposed-Endangered | Riparian zones along permanent waterways with dense and diverse vegetation consisting of grasses, sedges, and forbs | No riparian zones occur within the proposed action area. |
| Canada lynx (*Lynx canadensis*) | Federal-Candidate | Mature subalpine coniferous forests with uneven-aged stands, boulder outcrops, and downed logs. | No subalpine forests occur within the proposed action area; elevation too low. No riparian corridors suitable for migration occur in or near the proposed |

| | | | |
|---|---|---|---|
| | | | action area. |
| **PLANTS** | | | |
| Knowlton's cactus (*Pediocactus knowltonii*) | Federal-Endangered | Alluvial deposits that form rolling, gravelly hills in piñon-juniper and sagebrush communities (6,200-6,400 ft.). | Soils in the proposed project area are clay and sandy in texture and do not contain a high content of organic matter |
| Mancos milkvetch (*Astragalus humillimus*) | Federal-Endangered | Cracks of Point Lookout Sandstone of the Mesa Verde series (5,000-6,000 ft.). | Point Lookout Sandstone does not occur in the proposed action area. |
| Mesa Verde cactus (*Sclerocactus mesae-verde*) | Federal-Threatened | Highly alkaline soils in sparse shale or adobe clay badlands of the Mancos and Fruitland formations (4,000-5,550 ft.) | Parcel #73 does include Mancos or Fruitland Shale Formations. |
| | | | |

### 3.6.1 Other Special Status Species

In accordance with BLM Manual 6840, the Farmington Field Office of the Bureau of Land Management (FFO) has prepared a list of BLM sensitive species, as well as a special management species list that focuses on species management efforts to better maintain habitat areas under a multiple use mandate. These species are referred to as FFO Special Management Species (SMS). The BLM manages certain sensitive species not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered in the future (IM-NM-200-2008-001). Table 10 provides an evaluation of the potential for Special Management Species, BLM Sensitive Species and other special status species to occur in the proposed action area. The FFO has mapped potential habitats for those species which have readily defined habitat characteristics. The San Juan milkweed and the Mancos saltbush habitat have yet to be mapped due to their recent addition to the BLM Sensitive Species list (2011).

**Table 10. Habitat Descriptions and Presence of BLM FFO Special Status Species**

| Species Name | Conservation Status | | Habitat Associations | Potential to Occur in Analysis Area |
|---|---|---|---|---|
| | BLM/ USFWS | State of NM | | |
| **Birds** | | | | |
| Golden Eagle (*Aquila chrysaetos*) | SMS | | In the West, mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and trees. | The proposed action area contains suitable habitat for foraging, but nesting habitat marginal. |
| Ferruginous hawk *(Buteo regalis)* | SMS | | Grasslands and semi-desert shrub; occasionally piñon- | The proposed action area contains suitable piñon- |

| | | | | |
|---|---|---|---|---|
| | | | juniper edge habitat. Nest on rock spires in NW New Mexico. | juniper edge habitat for foraging with some nesting habitat. |
| Prairie falcon *(Falco mexicanus)* | SMS | | Arid, open country, grasslands or desert scrub, rangeland; nests on cliff ledges, trees, power structures. | The proposed action area contains suitable habitat for foraging and nesting. |
| Mountain plover *(Charadrius montanus)* | SMS | | Semi desert, grasslands, open arid areas, bare fields, breeds in open plains or prairie. | The proposed action area does not contain flat, open grasslands for suitable habitat. |
| Yellow-billed cuckoo *(Coccyzus americanus*) | SMS<br>BLM-S<br>FWS-C | | Low to mid-elevation riparian woodlands, deciduous woodlands, and abandoned farms and orchards. Rare in the San Juan River valley. | The proposed action area does not contain riparian areas for suitable habitat. |
| American peregrine falcon (*Falco peregrinus anatum*) | SMS<br>FWS-SC | NM-T | Open country near lakes or rivers with rocky cliffs and canyons. Tall city bridges and buildings also inhabited. | The proposed action area lacks suitable habitat for nesting. |
| Bald eagle (*Haliaeetus leucocephalus)* | SMS<br>BLM-S | NM-T | Near lakes, rivers and cottonwood galleries. Nests near surface water in large trees. May forage terrestrially in winter. | The proposed action area does not contain suitable habitat for nesting, foraging opportunities possible. |
| Western Burrowing owl *(Athene cunicularia)* | SMS<br>BLM-S<br>FWS-SC | | Associated with prairie dog towns. In dry, open, short-grass, treeless plains | The proposed action area does contain suitable habitat for foraging and nesting. Historic prairie dog colonies occur in the planning area but not active. |
| **Plants** | | | | |
| Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*) | SMS<br>BLM-S<br>FWS-SC | NM-E | Sandy clay slopes of the Nacimiento Formation in sparse semi desert, piñon-juniper grasslands and open arid areas of badland habitat (5,000-6,000 ft). | The proposed action area meet suitable habitat requirements for this species. |
| Aztec gilia (*Aliciella formosa*) | SMS<br>BLM-S<br>FWS-SC | NM-E | Arid and sparsely vegetated Badland /Salt desert scrub communities in soils of the Nacimiento Formation (5,000-6,000 feet). | The proposed action area meet suitable habitat requirements for this species. |
| Grama grass cactus (*Sclerocactus papyracanthus*) | BLM-S | | Open grasslands mixed with juniper-piñon woodlands, 5,000-7,000 ft. elevation. | The proposed action areas may meet suitable habitat requirements for this species. |
| Gypsum Townsend's aster (*Townsendia gypsophila*) | BLM-S | NM-SOC | Weathered gypsum outcrops of the Jurassic-age Todilto and overlying Morrison formations, 5,900-6,450 ft. elevation. | The proposed action areas are not known to include suitable habitat requirements for this species. |
| Knight's milkvetch (*Astragalus knightii*) | BLM-S | NM-SOC | Rimrock ledges of Dakota Formation sandstone in juniper savannah and grassland, 5,700- | The proposed action areas may meet suitable habitat requirements for this |

| | | | | |
|---|---|---|---|---|
| | | | 5,900 ft. elevation. | species. |
| Mancos Saltbush (*Proatriplex pleiantha)* | BLM-S | NM-SOC | Desert badlands of Colorado Plateau on saline clay soils of the Mancos and Fruitland shale formations; 5,000-5,500 ft. | The proposed action areas meet suitable habitat requirements for this species. |
| Parish's alkali grass (*Puccinellia parishii*) | BLM-S | NM-E | Alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes, 2,600-7,200 ft. elevation. | The proposed action areas are not known to include suitable habitat requirements for this species. |
| San Juan milkweed (*Asclepias sanjuanensis)* | BLM-S | NM-SOC | Sandy loam soils, usually in disturbed sites, in juniper savanna and Great Basin desert scrub; 5,000-5,500 ft. | The proposed action areas smeet suitable habitat requirements for this species |
| Tufted sand verbena (*Abronia bigelovii*) | BLM-S | NM-SOC | Hills and ridges of gypsum in the Todilto Formation, 5,700-5,400 ft. elevation. | The proposed action areas are not known to include suitable habitat requirements for this species. |
| NM-T = State of New Mexico Threatened Species; NM-E = State of New Mexico Endangered Species; NM-SOC=State of New Mexico Species of Concern; BLM-S BLM Sensitive Species; FWS-SC = USFWS Species of Concern; SMS = FFO Special Management Species. | | | | |

Additional information on Threatened, Endangered, and Sensitive Species in the Forest Service Parcels is contained in the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest 2008 (page 144-157).

**Wildlife**

The Piñon-Juniper plant communities in the northeastern part of the FFO provide habitat for herds of wintering and resident populations of mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*). Mule deer and elk are found most often on FFO land north of US Highway 550, and are much less common south of the highway due to the lack of suitable habitat. The BLM lands found in the Lindrith area north of Cuba provide yearlong habitat for a variety of wildlife species but most notably, deer and elk. The area between Lajara and Regina is utilized each fall/spring as a migration corridor for elk that migrate from the San Pedro Parks Wilderness, which is adjacent to the BLM and private lands, on their way to winter range in the Chaco area. Deer also migrate from the surrounding Apache Reservation into the Lindrith area to winter. Their numbers vary depending upon the severity of the winter. Deer and elk population density on FFO land varies by location and time of year.

Several small populations of pronghorn antelope (*Antilocapra americana*) reside in the area north and east of US Highway 550 and are much less common south of the highway due to the lack of suitable habitat. Deer and elk population density on FFO land varies by location and time of year.

Detailed information on other wildlife species and habitats in the FFO is contained on pages 3-39 to 3-42 of the PRMP/FEIS and the background biological resources analysis (SAIC 2002) prepared for the RMP.

Additional information on wildlife in the Forest Service Parcels is contained in the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest 2008 (page 103-132).

**Migratory Birds**

A Memorandum of Understanding (MOU) between the BLM and USFWS dated April 12, 2010 calls for increased efforts to more fully implement the Migratory Bird Treaty Act of 1918 (DOI 2010a). In keeping with this mandate, the BLM/FFO has issued an interim policy to minimize unintentional take as defined by the MOU and to better optimize migratory bird efforts related to BLM/FFO activities (DOI 2010b). In keeping with this policy, a list of priority birds of conservation concern which occur in similar eco-regions as the proposed action area was compiled through a review of existing bird conservation plans including:
Fish and Wildlife Service (USFWS) Birds of Conservation Concern (BCC)
New Mexico Partners in Flight (NMPIF) New Mexico Bird Conservation Plan
Comprehensive Wildlife Conservation Strategy for New Mexico (CWCS)
Gray Vireo Recovery Plan
The North American Waterbird Conservation Plan
Recovery plans and conservation plans/strategies prepared for federally-listed candidate species.

The selected species have a known distribution in the FFO area within the piñon-juniper vegetation community and may be affected by the proposed action. These species and a brief assessment of their habitat can be found in Table 11.

**Table 11. Migratory Birds with Potential to Occur in the Proposed Action Area**

| Species Name | Habitat Associations | Potential to Occur in the Proposed Action Area |
|---|---|---|
| Montezuma quail (*Cyrtonyx montezumae*) | Open oak, pine-oak, or piñon-juniper with well-developed grassy understory; prefers 70% or more tall grass cover. | Lack of significant grassy understory within the analysis area limits habitat. |
| Broad-tailed hummingbird (*Selasphorus platycercus*) | Piñon-juniper woodlands, montane riparian areas and thickets, and open, mixed conifer forests. | Piñon-juniper woodland in the analysis area could provide suitable habitat for the species. |
| Cassin's kingbird (*Tyrannus vociferans*) | Found in open country with scattered trees (savannahs) or open woodlands including piñon-juniper. | Piñon-juniper/sagebrush edge of the analysis area may provide preferred habitat. |
| Loggerhead shrike (*Lanius ludovicianus*) | Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges. | No open country interspersed with grassy areas occurs in or near the project area. |
| Gray vireo (*Vireo vicinior*) | In northern NM, stands of piñon pine and Utah juniper 5800 - 7200 ft, open with a shrub component and mostly bare ground; antelope bitterbrush, mountain mahogany, Utah serviceberry and big sagebrush often present. Broad, flat or gently sloped canyons, in areas with rock outcroppings, or near ridge-tops. | Piñon-juniper woodland in the analysis area could provide suitable habitat for the species. |
| Plumbeous vireo (*Vireo plumbeus*) | Denser piñon-juniper woodland at higher elevations (and ponderosa forests) with some deciduous understory. | Low elevation sparse woodland not likely to provide habitat. |
| Western scrub-jay (*Aphelocoma californica*) | Scrub and open woodland habitats. | Piñon-juniper woodland in the analysis area could provide suitable habitat for the species. |

| Species Name | Habitat Associations | Potential to Occur in the Proposed Action Area |
|---|---|---|
| Piñon jay (*Gymnorhinus cyanocephalus*) | Piñon-juniper habitat, due to the species' tightly co-evolved relationship with piñon pines. | Piñon-juniper woodland in the analysis area could provide suitable habitat for the species. |
| Juniper titmouse (*Baeolophus griseus*) | Open, mixed woodland areas at mid-elevations, most common where juniper is dominant; high overstory cover; requires large, mature trees for cavity nesting. | Piñon-juniper woodland in the analysis area could provide suitable habitat for the species. |
| Western bluebird (*Sialia mexicana*) | Open piñon-juniper, often burned or moderately logged areas; requires larger trees and snags for cavity nesting. | Piñon-juniper woodland in the analysis area could provide suitable habitat for the species. |
| Mountain bluebird (*Sialia currucoides*) | Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting. | Piñon-juniper woodland in the analysis area could provide suitable habitat for the species. |
| Bendire's thrasher (*Toxostoma bendirei*) | On the Colorado Plateau, inhabits open sagebrush with scattered junipers; sparse or degraded understory, lower elevations. | While juniper does occur in the analysis area, it is associated with piñon in a woodland setting. There is no dry open habitat typical of the preferred habitat. |
| Virginia's warbler (*Vermivora virginae*) | Coniferous woodland or forest mixed with deciduous shrubs or trees; dense understory is critical; steep draws or scrubby hillsides especially favored | Lack of significant deciduous component limits preferred habitat. |
| Black-throated gray warbler (*Dendroica nigrescens*) | Large stands of mature piñon-juniper woodland often with brushy undergrowth. | Lack of mature woodland limits preferred habitat. |
| Black-chinned sparrow (*Spizella atrogularis*) | Moderately dense montane shrubs from 3-7 ft tall mixed with rocky outcroppings; large grass component and openings. | No montane shrub dominated areas exist in or near the project area. |
| Cassin's finch (*Carpodacus cassinii*) | Breeds in higher mountains. Fall and winter moves into lower mountains and foothills, especially areas where piñon pine cone crops are excellent. | Piñon-juniper woodland in the analysis area could provide suitable winter habitat for the species. |

Additional information on Migratory Birds resources in the Forest Service Parcels is contained in the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest 2008 (page 132-142).

**Environmental Justice**

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, requires that federal agencies identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

Environmental justice refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies. It focuses on environmental hazards and human health to avoid disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Guidance on environmental justice terminology developed by the President's Council on Environmental Quality (CEQ 1997) is discussed below.

- Low-income population. A low-income population is determined based on annual statistical poverty thresholds developed by the US Census Bureau. In 2012, poverty level is based on total income of $11,720 for an individual and $23,283 for a family of four (US Census Bureau 2012d). A low-income community may include either a group of individuals living in geographic proximity to one another or dispersed individuals, such as migrant workers or Native Americans.
- Minority. Minorities are individuals who are members of the following population groups: American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic.
- Minority population area. A minority population area is so defined if either the aggregate population of all minority groups combined exceeds 50 percent of the total population in the area or if the percentage of the population in the area comprising all minority groups is meaningfully greater than the minority population percentage in the broader region. Like a low-income population, a minority population may include either individuals living in geographic proximity to one another or dispersed individuals.
- Comparison population. For the purpose of identifying a minority population or a low-income population concentration, the comparison population used in this study is the state of New Mexico as a whole

Low-income Populations

Income and poverty data estimates for study area counties from the US Census Small Area Poverty Estimates model indicate that the percent of the population living below the poverty level in the socioeconomic study area as a whole is slightly above that of the state (21.3 percent and 20.6 percent), but it is much higher than the national average of 12.1 percent. See **Table A-33**, Study Area County Population in Poverty (2012). Poverty levels ranged from 37.7 percent in McKinley County to 13.7 percent in San Juan County. Only that of Sandoval County was below the state average.

**Table A-33 Study Area County Population in Poverty (2002-2012)**

| | McKinley County | Rio Arriba County | Sandoval County | San Juan County | Study Area Total | New Mexico | United States |
|---|---|---|---|---|---|---|---|
| Percent of Population in Poverty 2002 | 21,766 | 7,165 | 19,934 | 22,152 | 71,017 | 421,123 | 34,569,951 |
| | 30.2% | 17.7% | 11.1% | 18.2% | 21.3% | 20.6% | 12.1% |
| Percent of Population in Poverty 2012 | 27,296 | 8,806 | 18,502 | 25,802 | 80,406 | 327,444 | 48,760,123 |
| | 37.7% | 22.0% | 13.7% | 20.3% | 21.5% | 17.7% | 15.9% |
| Median Household Income 2002 | $25,197 | $30,557 | $45,213 | $34,329 | N/A | $34,827 | $45,409 |
| Median Household Income 2012 | $29,821 | $36,900 | $57,376 | $45,901 | N/ A | $42,828 | $51,371 |
| Classified as Low Income Population in 2012 based on CEQ guidelines? | No | No | No | No | No | NA | NA |
| Source: US Census Bureau 2013b | | | | | | | |

Similarly, estimates from 2012 indicate that Sandoval and San Juan Counties had household median incomes ($57,376 and $45,901) that were above the state level of $42,828. McKinley County ($29,821) and Rio Arriba County ($36,900) were below that of the state in 2012. While no area communities meet the CEQ definition of a low-income population area (50 percent or

higher), the highest poverty rates were seen in Bloomfield (29 percent), Espanola (26.3 percent), and Bernalillo (24.1 percent).

See **Table A-34**, Study Area Key Community Race/Ethnicity and Poverty Data.

**Table A-34 Study Area Key Community Race/Ethnicity and Poverty Data**

| Community | % Population Racial or Ethnic Minority | Classified as Minority Population based on CEQ? | % of Individuals Below Poverty | Classified as Low-income Population based on CEQ? |
|---|---|---|---|---|
| Aztec | 36.4% | N | 14.4% | N |
| Bernalillo | 78.8% | Y | 24.1% | N |
| Bloomfield | 55.8% | Y | 29.0% | N |
| Espanola | 91.6% | Y | 26.3% | N |
| Farmington | 48.8% | N | 15.5% | N |
| Gallup | 76.9% | Y | 20.9% | N |
| Rio Rancho | 46.7% | N | 9.8% | N |

Source: US Census Bureau 2012b
Note: American Community Survey estimates are based on data collected over a 5-year time period. The estimates represent the average characteristics of populations between January 2008 and December 2012 and do not represent a single point in time.

Census Tracts are geographic regions within the United States that are defined by the US Census Bureau in order to track changes in a population over time. Census Tracts are based on population sizes and not geographic areas. The average population of a Census Tracts is about 4,000 people, so rural areas that are sparsely populated may have very large Census Tracts while densely populated urban areas may have very small Census Tracts.

When broken down by Census Tract, 3 out of 87 tracts in the socioeconomic study area have greater than 50 percent of individuals living below the poverty line: Census Track 9440 in eastern McKinley County had an individual poverty rate of 54.6 percent; Census Tract 9405 in southwestern McKinley County had an individual poverty rate of 59.4 percent; and Census Tract 9409 in northwestern Sandoval County had an individual poverty rate of 51.9 percent (US Census Bureau 2012b). These 3 Census Tracts are all relatively large, indicating a sparsely populated, rural area.

Minority Populations

Based on 2008-2012 data, minorities made up 59.5 percent of the population in New Mexico, compared to 36.3 percent in the United States as a whole ( **Table A-35**, Study Area County Population by Race/Ethnicity [2012]). The proportion of minorities in the socioeconomic study area (65.3 percent) substantially exceeded the United States and is slightly higher than the state average. At the county level, the population ranged from 89.7 percent minority in McKinley County to 52.8 percent in Sandoval County. Within relevant tribal nations, Native Americans represented the vast majority of the population. The largest minority groups were Hispanics/Latinos in Rio Arriba and Sandoval Counties and Native Americans in McKinley and San Juan Counties.

**Table A-35 Study Area County Population by Race/Ethnicity (2008-2012)**

| Population | McKinley County | Rio Arriba County | Sandoval | San Juan | Study Area | New Mexico | United States | Jicarilla Apache Nation | Navaho Nation | Ute Mountain Nation |
|---|---|---|---|---|---|---|---|---|---|---|
| Hispanic or Latino ethnicity of any race | 9,744 | 28,714 | 46,334 | 24,496 | 109,288 | 952,569 | 50,545,275 | 382 | 2,958 | 99 |
| | 13.6% | 71.4% | 35.3% | 19% | 29% | 46.3% | 16.4% | 11.6% | 1.7% | 6.0% |
| White alone | 7,413 | 5,370 | 61,977 | 54,218 | 128,978 | 831,543 | 196,903,968 | 74 | 3,762 | 47 |
| | 10.3% | 28.6% | 47.2% | 42.2% | 34.67% | 40.5% | 63.7% | 2.3% | 2.2% | 2.9% |
| Black or African American alone | 353 | 149 | 2,704 | 794 | 4000 | 35,586 | 37,786,591 | 0 | 250 | 5 |
| | 0.5% | 0.4% | 2.1% | 0.6% | 1.08% | 1.7% | 12.2% | 0% | 0.1% | 0.3% |
| American Indian or Alaskan Native alone | 52,358 | 5,629 | 15,964 | 46,676 | 120,627 | 176,766 | 2,050,766 | 2,692 | 162,920 | 1,429 |
| | 72.8% | 14.0% | 12.2% | 36.3% | 32.43% | 8.6% | 0.7% | 82.0% | 94.3% | 87.0% |
| Asian alone | 506 | 173 | 1,685 | 464 | 2828 | 25,411 | 14,692,794 | 73 | 834 | 14 |
| | 0.7% | 0.4% | 1.3% | 0.4% | 0.76% | 1.2% | 4.8% | 2.2% | 0.5% | 0.9% |
| Native Hawaiian and Other Pacific Islander alone | 38 | 7 | 100 | 72 | 217 | 989 | 480,063 | 0 | 209 | 0 |
| | 0.1% | 0% | 0.1% | 0.1% | 0.06% | <.01% | 0.2% | 0% | 0.1% | 0% |
| Some Other Race | 7 | 22 | 437 | 84 | 550 | 3,623 | 616,191 | 0 | 102 | 0 |
| | <.01% | 0.1% | 0.3% | 0.1% | 0.15% | 0.2% | 0.2% | 0% | 0.1% | 0% |
| Two or more Races | 1,469 | 137 | 2,101 | 1,796 | 5,503 | 28,800 | 6,063,063 | 62 | 1,660 | 49 |
| | 2.0% | 0.3% | 1.6% | 1.4% | 1.48% | 1.4% | 2.0% | 1.9% | 1.0% | 3.0% |
| Classified as Minority Population based on CEQ guidelines? | Yes | Yes | Yes | Yes | | Yes | NA | Yes | Yes | Yes |

Source: US Census Bureau 2012b
Note: American Community Survey estimates are based on data collected over a 5-year time period. The estimates represent the average characteristics of populations between January 2008 and December 2012 and do not represent a single point in time

Based on the CEQ definition of a minority population area (minority residents exceed 50 percent of all residents), Bernalillo, Bloomfield, Espanola, and Gallup all are considered minority communities. See **Table A-34**, Study Area Key Community Race/Ethnicity and Poverty Data.

When examined at the Census Tract level, there are 24 out of 87 tracts that have a minority population greater than 50 percent. These range from Census Tract 6.1 located just north of the city of Aztec with a minority population of 80.5 percent to Census Tract 107.17 located north of the city of Rio Rancho with a minority population of 50.2 percent (US Census Bureau 2012b). These Census Tracts are relatively small and are based around the city of Rio Rancho and the Aztec/Farmington/Bloomfield area.

Native American Populations

Data in **Table A-35**, Study Area County Population by Race/Ethnicity (2008-2012), account for a substantial portion of the study area population in some areas, notably McKinley and San Juan Counties, where the population is 72.8 and 36.3 percent American Indian respectively. Three tribal governments have reservations within the planning area: the Jicarilla Apache Nation, the Navajo Nation, and the Ute Mountain Nation (see **Table 4-1**, Tribal Nations in the Planning Area). The Southern Ute Nation has lands just north of the planning area in the state of Colorado, but none within the planning area. Almost one half of the planning area is tribal lands. Each tribe maintains a general concern for protection of and access to areas of traditional and religious importance, and the welfare of plants, animals, air, landforms, and water on reservation and public lands. Policies established in 2006 by the BLM and US Forest Service, in coordination with federal tribes, ensure access by traditional native practitioners to area plants. The policy also ensures that management of these plants promotes ecosystem health for public lands. The BLM is encouraged to support and incorporate into their planning traditional native and native practitioner plant-gathering for traditional use (Boshell 2010).

**Table 4-1 Tribal Nations in the Planning Area**

| Tribe | Acres in Planning Area | General Location |
|---|---|---|
| Jicarilla Apache Nation | 739,600 | The majority of the Jicarilla Apache Nation is located in western Rio Arriba County, but within the eastern portion of the planning area |
| Navajo Nation | 860,900 | A portion of the Navaho Nation extends into western San Juan County and into the western portion of the planning area |
| Ute Mountain Nation | 103,500 | A portion of the Ute Mountain Nation extends into the northern portion of San Juan County, just east of the Navajo Nation, and into the northern portion of the planning area |
| Unknown | 196,300 | Lands located in the southern portion of the planning area [Note to BLM: this is due to inconsistencies between US Census Bureau tribal areas dataset and BLM land status dataset.] |
| Source: BLM GIS 2014, US Census Bureau 2014 | | |

**No Action Alternative**

Under the No Action Alternative (Preferred Alternative) the proposed parcels would be deferred and not offered for sale in the February 2014 Competitive Oil and Gas Lease Sale. There would be no subsequent impacts from oil and/or gas construction, drilling, and production activities. The No Action Alternative would result in the continuation of the current land and resource uses in the proposed lease areas.

**Mineral Resources**

There would be no new impacts from oil and gas production on the proposed parcel land. Oil and gas development of federal, state, private, and Indian minerals would continue on the land surrounding the proposed parcels. No additional natural gas or crude oil from the proposed parcels would enter the public markets and no royalties would accrue to the federal or state treasuries. An assumption is that the No Action Alternative (no lease option) would not affect current domestic production of oil and gas. However, this may result in reduced Federal and State royalty income, and the potential for Federal land to be drained by wells on adjacent private or state land. Oil and gas consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demography, and weather or climate. If the BLM were to forego leasing and potential development of the proposed parcels, the assumption is that the public's demand for the resource would not be expected to change. Instead, the mineral resource foregone would be replaced in the short- and long-term by other sources that may include a combination of imports, using alternative energy sources (e.g. wind, solar), and other domestic production.
This offset in supply would result in a no net gain for oil and gas domestic production.

**Environmental Justice**

By not leasing the proposed parcels under the Proposed Action, there may be negative effects on the overall employment opportunities related to the oil and gas and service support industry, as well as a loss of the economic benefits to state and county governments related to royalty payments and severance taxes. However, there would be no increases in activity and noise associated with areas used for other purposes.

**All Other Resources**

No other resources would be affected under the Proposed Action as there would be no potential surface disturbance that could detrimentally affect these resources. The No Action Alternative would result in the continuation of the current land and resource uses on the parcels. However, the selection of the no action alternative would not preclude these parcels from being nominated and considered in a future lease sale, which would result in impacts as described under the action alternatives.

**Analysis of the Proposed Action**

**Assumptions for Analysis**

The act of leasing the parcel would, by itself, have no impact on any resources in the FFO. All impacts would be linked to as yet undetermined future levels of lease development.

If the lease parcels were developed, short-term impacts would be stabilized or mitigated within five years and long-term impacts are those that would substantially remain for more than five years. Potential impacts and mitigation measures are described below.

Cumulative impacts include the combined effect of past projects, specific planned projects and other reasonably foreseeable future actions such as other infield wells being located within this lease. Potential cumulative effects may occur should an oil and gas field be discovered if this parcel was drilled and other infield wells are drilled within this lease or if this lease becomes part of a new unit. All actions, not just oil and gas development may occur in the area, including foreseeable non-federal actions.

The reasonable and foreseeable development scenario developed for the Farmington RMP forecasted 497 wells would be drilled annually on existing and new leases for Federal minerals. Since 2000, an average of 459 wells has been drilled annually

Considering spacing requirements and potential formation development, Table 18 displays the number of wells and number of well pads that may be required to develop the parcels. Surface disturbance assumptions and impacts associated with oil and gas exploration and development drilling activities are based on this development scenario.

**Table 2. Development Scenario by Lease Parcel**

| Lease Parcel # | Acres | Estimated Development |
|---|---|---|
| NM-201410-001 | 1035 | Considering spacing requirements and potential formation development, a maximum of five (5) vertical wells may be required to develop this tract from five (5) well pads. |
| NM-201410-002 | 160 | Considering spacing requirements and potential formation development, a maximum of one (1) vertical well may be required to develop this tract from the maximum of one (1) well pad. |
| NM-201410-003 | 200 | Considering spacing requirements and potential formation development, a maximum of two (2) vertical wells may be required to develop this tract from two (2) well pads. |
| NM-201410-004 | 676.28 | Considering spacing requirements and potential formation development, a maximum of five (5) vertical wells may be required to develop this tract from five (5) well pads. |
| NM-201410-005 | 320 | Considering spacing requirements and potential formation development, a maximum of two (2) vertical wells may be required to develop this tract from two (2) well pads. |
| NM-201410-006 | 819.5 | Considering spacing requirements and potential formation development, a maximum of three (3) vertical wells may be required to develop this tract from three (3) well pads. |
| NM-201410-007 | 2311.68 | Considering spacing requirements and potential formation development, a maximum of eleven (11) vertical wells may be required to develop this tract from eleven (11) well pads. |
| NM-201410-008 | 1078 | Considering spacing requirements and potential formation development, a maximum of five (5) vertical wells may be required to develop this tract from five |

| | | |
|---|---|---|
| | | (5) well pads. |
| NM-201410-009 | 2409.55 | Considering spacing requirements and potential formation development, a maximum of twelve (12) vertical wells may be required to develop this tract from twelve (12) well pads. |
| NM-201410-010 | 2081.62 | Considering spacing requirements and potential formation development, a maximum of eight (8) vertical wells may be required to develop this tract from eight (8) well pads. |
| NM-201410-011 | 2306.52 | Considering spacing requirements and potential formation development, a maximum of eleven (11) vertical wells may be required to develop this tract from eleven (11) well pads. |
| NM-201410-012 | 1572.7 | Considering spacing requirements and potential formation development, a maximum of five (5) vertical wells may be required to develop this tract from five (5) well pads. |
| NM-201410-013 | 2242.62 | Considering spacing requirements and potential formation development, a maximum of nine (9) vertical wells may be required to develop this tract from nine(9) well pads. |
| NM-201410-014 | 1110.52 | Considering spacing requirements and potential formation development, a maximum of eight (8) vertical wells may be required to develop this tract from eight (8) well pads. |
| NM-201410-015 | 1823.68 | Considering spacing requirements and potential formation development, a maximum of eleven (11) vertical wells may be required to develop this tract from eleven (11) well pads. |
| NM-201410-016 | 160 | Considering spacing requirements and potential formation development, a maximum of one (1) vertical well may be required to develop this tract from the maximum of one (1) well pad. |
| NM-201410-018 | 39.9 | Considering spacing requirements and potential formation development, a maximum of one (1) vertical well may be required to develop this tract from the maximum of one (1) well pad. |
| NM-201410-024 | 40 | Considering spacing requirements and potential formation development, a maximum of one (1) vertical well may be required to develop this tract from the maximum of one (1) well pad. |
| NM-201410-026 | 80 | Considering spacing requirements and potential formation development, a maximum of one (1) vertical well may be required to develop this tract from the maximum of one (1) well pad. |
| NM-201410-027 | 160 | Considering spacing requirements and potential formation development, a maximum of one (1) vertical well may be required to develop this tract from the maximum of one (1) well pad. |
| NM-201410-028 | 160 | Considering spacing requirements and potential formation development, a maximum of one (1) vertical well may be required to develop this tract from the maximum of one (1) well pad. |
| NM-201410-030 | 160 | Considering spacing requirements and potential formation development, a maximum of two (2) vertical well may be required to develop this tract from the maximum of two (2) well pads. |
| NM-201410-031 | 160 | Considering spacing requirements and potential formation development, a maximum of two (2) vertical well may be required to develop this tract from the maximum of two (2) well pads. |
| NM-201410-034 | 320 | Considering spacing requirements and potential formation development, a maximum of three (3) horizontal wells may be required to develop this tract from the one (2) well pads. |
| NM-201410-035 | 1897.86 | Considering spacing requirements and potential formation development, a maximum of twelve (12) horizontal wells may be required to develop this tract from the six (6) well pads. |
| * See Appendix A for a summary of stipulations | | |

One typical vertical wellpad has about 3.03 acres of disturbance with about 0.65 acres of long term disturbance. One typical horitontal well pad has approximatly 5.73 acres of disturbance with 1 acres of long term disturbance.

**Air Resources**

Methodology and assumptions for calculating air pollutant and greenhouse gas emissions are described in the Air Resources Technical Report. This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one well. The calculators give an approximation of criteria pollutant, HAP and GHG emissions to be compared to regional and national levels. Also incorporated into this document are the sections describing the assumptions that the FFO used in developing the inputs for the calculator (U.S. Department of Interior Bureau of Land Management, 2014).

Although the fracking of wells within a lease parcel is hard to predict, it is anticipated that with more wells being drilled, there will be an increase in the amount of wells being fracked and completed. Volatile organic compounds are emitted during the completion of hydraulically fractured wells. There is a higher probability of dust particulates in the atmosphere from the increase in vehicular traffic due to hydraulically fracturing wells.

## Air Quality

Under the action alternative, leasing the subject tracts would have no direct impacts to air quality. Any potential effects to air quality from sale of lease parcel would occur at such time that the lease is developed. Potential impacts of development of the proposed lease could include increased air borne soil particles blown from new well pads or roads, exhaust emissions from drilling equipment, compressors engines, vehicles, flares, and dehydration and separation facilities, and volatile organic compounds during drilling or production activities.

There are three phases in the development of a well that result in different levels of emissions. The first phase occurs during the first year of development and may include pad construction, drilling, completion, interim reclamation, and operation of the completed well. The first year results in the highest level of emissions due to the large engines required during the construction and drilling, and the potential release of natural gas to the atmosphere during completion.

The second phase of the well begins after the well is completed and is put on line for production. Emissions during the production phase may include vehicle traffic, engines to pump oil if necessary, compressor engines to move gas through a pipeline, venting from storage tanks, and storage tank heaters. A workover of the well may occasionally be required, but the frequency of workovers is not predictable.

The final phase is to plug and abandon the well and rehab the pad. The life of the well is unknown and emission estimates for this phase are not presented.

## Criteria Pollutants

Table 3 shows total human caused emissions for each of the counties in the FFO based on EPA's 2011 emissions inventory (U.S. Environmental Protection Agency, 2014).

**Table 3. Analysis Area Emissions in Tons/Year, 2011**

| County | $NO_X$ (1) | CO (2) | VOC (3) | $PM_{10}$ (4) | $PM_{2.5}$ (5) | $SO_2$ (6) |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| McKinley | 11,952.9 | 17,007.8 | 3,891.2 | 70,096.4 | 7,645.2 | 1,381.1 |
| Rio Arriba | 12,012.3 | 27,344.6 | 19,149.8 | 33,761.2 | 4,130.6 | 60.4 |
| San Juan | 42,231.5 | 63,568.9 | 26,110.8 | 76,638.3 | 9,201.0 | 5,559.3 |
| Sandoval | 4,143.8 | 19,513.9 | 4,373.1 | 39,343.0 | 4,510.8 | 109.3 |
| **Total** | **70,340.5** | **127,435.2** | **53,525.0** | **219,838.9** | **25,487.6** | **7,110.0** |

(1) $NO_X$ – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) $PM_{10}$ – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(6) $SO_2$ – sulfur dioxide

While all of San Juan County is in attainment of all NAAQS including ozone, the Navajo Dam monitoring station is the most closely watched due to the current design value of 0.071 ppm. While 0.071 ppm is well below the attainment value of 0.075ppm, it is the highest design value of the three monitoring stations in San Juan County. The potential amounts of ozone precursor emissions of $NO_x$ and VOCs from the proposed lease sale are not expected to impact the current design value for ozone in San Juan County under either of the action alternatives.

In October 2012, USEPA promulgated air quality regulations for completion of hydraulically fractured gas wells. These rules require air pollution mitigation measures that reduce the emissions of volatile organic compounds during gas well completions.

**Greenhouse Gases**

Information about (GHGs) and their effects on national and global climate is presented in the Air Resources Technical Report (U.S. Department of Interior Bureau of Land Management, 2014). Analysis of the impacts of the proposed action on GHG emissions will be reported below. Only the GHG emissions associated with exploration and production of oil and gas will be evaluated here because the environmental impacts of GHG emissions from oil and gas consumption, such as refining and emissions from consumer-vehicles, are not effects of the proposed action as defined by the Council on Environmental Quality because they do not occur at the same time and place as the action. Thus, GHG emissions from consumption of oil and gas do not constitute a direct effect that is analyzed under NEPA. Nor is consumption an indirect effect of oil and gas production because production is not a proximate cause of GHG emissions resulting from consumption. However, emissions from consumption and other activities are accounted for in the cumulative effects analysis.

Leasing the subject tracts under either action alternative would have no direct impacts to climate change as a result of GHG emissions. Any potential effects to air quality from sale of a lease parcel would occur at such time that the lease was developed. The potential full development of the proposed lease sale is estimated at 118 oil wells (see Assumptions for Analysis for more information).

The two primary GHGs associated with the oil and gas industry are carbon dioxide ($CO_2$) and methane ($CH_4$). Because methane has a global warming potential that is 21-25 times greater than the warming potential of $CO_2$, the EPA uses measures of $CO_2$ equivalent ($CO_2e$) which takes the

difference in warming potential into account for reporting greenhouse gas emissions. Emissions will be expressed in metric tons of $CO_2$ equivalent in this document.

Oil and Gas production in New Mexico is concentrated in the northwest corner, the San Juan Basin, and the southeast corner, the Permian Basin. Production in the San Juan Basin is mostly natural gas while production in the Permian Basin is mostly oil. Production statistics developed from the New Mexico Oil Conservation Division for 2012 are shown in Table 4 for the US, New Mexico and for wells on federal leases in each basin.

**Table 4. 2012 Oil and Gas Production (Petroleum Recovery Research Center, 2014)**

| | Oil Barrels (bbl) | % U.S. Total | Gas (MMcf) | % U.S. Total |
|---|---|---|---|---|
| United States | 2,364,835,000 | 100 | 25,307,949 | 100 |
| New Mexico | 85,045,000 | 3.60 | 1,215,773 | 4.80 |
| Federal leases in New Mexico | 42,109,245 | 1.80 | 776,698 | 3.07 |
| San Juan Basin | 584,828 | 0.02 | 580,474 | 2.29 |
| Permian Basin | 41,524,417 | 1.80 | 70,329 | 0.03 |

Table 5 shows an estimate of greenhouse gas emissions for oil and gas field production for the U.S., New Mexico, and Federal leases by basin based on the assumption that greenhouse gas emissions are proportional to production. Because oil and gas leaves the custody and jurisdiction of the BLM after the production phase and before processing or refining, only emissions from the production phases are considered here. It should also be remembered that following EPA protocols, these numbers do not include fossil fuel combustion which would include such things as truck traffic, pumping jack engines, compressor engines and drill rig engines. Nor does it include emissions from power plants that generate the electricity used at well sites and facilities.

**Table 5. 2012 Oil and Gas Field Production Emissions (U.S. Environmental Protection Agency, 2014)**

| | Oil | | Gas | | Total O&G Production | %U.S. Total GHG mission s |
|---|---|---|---|---|---|---|
| (Metric Tons $CO_2^e$) | $CO_2$ | $CH_4$ | $CO_2$ | $CH_4$ | | |
| United States | 300,000 | 31,000,000 | 10,800,000 | 53,400000 | 95,500,000 | 1.65 |
| New Mexico | 10,800 | 1,116,000 | 518,400 | 2,563,200 | 4,208,400 | 0.07 |
| Federal leases in New Mexico | 5,400 | 558,000 | 331,560 | 1,639,380 | 2,534,340 | 0.04 |
| San Juan Basin | 60 | 6,200 | 247,320 | 1,222,860 | 1,476,440 | 0.03 |
| Permian Basin | 5,400 | 558,000 | 3,240 | 16,020 | 582,660 | 0.01 |

Table 5 provides an estimate of direct emissions that occur during exploration and production of oil and gas. For natural gas, extraction accounts for 55% of total life cycle $CO_2e$ emissions, processing accounts for 27% and transmission accounts for 18% of life cycle $CO_2e$ emissions (U.S. Department of Energy, 2011). For oil, drilling and development is responsible for 8% of the total life cycle $CO_2e$ emissions, whereas transportation of the petroleum to refineries represents about 10% of the emissions, and final consumption as a transportation fuel represents fully 80% of emissions (U.S. Department of Energy, 2008).

To estimate the potential emissions from the proposed lease sale, an estimate of emission per well is useful. To establish the exact number of federal wells in the San Juan Basin is problematic due to the ongoing development of new wells, the abandonment of unproductive wells, land sales and exchanges, and incomplete or inaccurate data bases. To determine the most transparent and publicly accessible method of estimating the number of active federal wells in the New Mexico portion of the San Juan Basin, FFO utilized BLM New Mexico Geographic Information System (GIS) and the New Mexico Conservation Division ONGARD Data Search Page. ONGARD was searched for all active, new, and temporarily abandoned wells in NM.

**Potential Greenhouse Gas Emissions Resulting from Proposed Lease Sale Referenced to Latest Available Estimates from 2012**

| | | |
|---|---|---|
| Total U.S. GHG Emissions From All Sources | 6,501,500,000 metric tons | 100.00 % |
| Total U.S. GHG Emissions From Oil & Gas Field Production | 95,500,000 metric tons | 1.47% |
| Total New Mexico Emissions From Oil & Gas Field Production | 4,208,400 metric tons | .06% |
| Total Federal Mineral Estate San Juan Basin Emissions From Oil & Gas Field Production (14,995 wells) | 1,476,440 metric tons | .02% |
| Total Federal Mineral Estate Permian Basin Emissions From Oil & Gas Field Production (12,443 wells) | 582,660 metric tons | .0009% |
| Total Potential GHG Emissions From Oil & Gas Field Production at Full Development (118 Wells) | 11,611 metric tons | 0.0018% |

The table above shows estimated annual emissions from 2 San Juan Basin federal leases at 1,476,440 metric tons $CO_2e$. Therefore, the estimate of emission per well in the San Juan Basin is 98.4 metric tons $CO_2e$ annually. In the unlikely event that 118 separate wells were drilled on the proposed leases, the maximum emissions resulting from the lease sale would be 11,611 metric tons $CO_2e$ per year.

**Potential Mitigation**: The EPA's inventory data describes "Natural Gas Systems" and "Petroleum Systems" as the two major categories of total US sources of GHG gas emissions. The inventory identifies the contributions of natural gas and petroleum systems to total $CO_2$ and $CH_4$ emissions (natural gas and petroleum systems do not produce noteworthy amounts of any of the other greenhouse gases). Within the larger category of "Natural Gas Systems", the EPA identifies emissions occurring during distinct stages of operation, including field production, processing, transmission and storage, and distribution. "Petroleum Systems" sub-activities include production field operations, crude oil transportation and crude oil refining. Within the two categories, the BLM has authority to regulate only those field production operations that are related to oil and gas measurement, and prevention of waste (via leaks, spills and unauthorized flaring and venting).

Between 2008 and 2012, methane and carbon dioxide emissions from oil production have increased nationally due to increases in domestic oil production. Between 2006 and 2012, methane emissions from natural gas production declined significantly due to improved practices and the use of green completions with hydraulic fracturing. However, during the same period, carbon monoxide emissions from natural gas production increased significantly due to increases in flaring (U.S. Environmental Protection Agency, 2014). The Field Office will work with industry to facilitate the use of the relevant BMPs for operations proposed on Federal mineral leases where such mitigation is consistent with agency policy.

#### Heritage Resources

### Cultural Resources

While the act of leasing a parcel would produce no impacts, subsequent development of the lease could have impacts/effects on cultural resources/historic properties.

Potential threats to cultural resources from leasing are variable and dependent upon the nature of the cultural resource and the nature of the proposed development. Effects normally and most often include alterations to the physical integrity of a cultural resource. The greatest potential impact to cultural resources stems from the construction of associated lease related facilities such as pipelines, power lines, roads, and well locations, as well as an increase in human activity or access to the area with the increased potential of unauthorized removal or other alteration to cultural resources in the area. These activities could affect one or more aspects of a historic properties physical integrity including location, design, materials, and workmanship. If a cultural resource is significant for other than its scientific information, effects may also include the introduction of audible, atmospheric, or visual elements that are out of character for the cultural site and diminish one or more of the historic properties aspects of integrity including setting, feeling, and association, if those aspects of integrity contribute to conveying the significance of the historic property.

Conversely, cultural resource investigations associated with development add to an understanding of the prehistory/history of the area under investigation, and cultural resources that would otherwise remain undiscovered and unevaluated are identified. Most of the cultural resources identified within the proposed action and within the APEs were identified by investigations associated with the planning of proposed development.

The BLM has applied the criteria of adverse effect as defined in 36 CFR 800.5(1) to the proposed action and will propose to the SHPO and other consulting parties that the effect will not be adverse provided that the design features enumerated for the proposed action are adhered to and avoidance and protective measures associated with the preservation of cultural resources are considered the preferred course of action during individual lease development analysis and authorizations, including any effects that could reasonably involve the seven aspects of integrity for historic properties that may occur later in time, be further removed in distance or be cumulative.

**Cultural Landscapes**

The proposed action would is not expected to threaten or diminish the integrity or adversely affect the capability of considering any identified landscape characteristics of human use or activity in the APE (National Park Service 1999, Birnbaum and Peters 1996), nor would it compound the inherent problems associated with landscape approaches to archaeological remains (Zvelebil et al. 1992).

**Native American Religious Concerns**

The proposed action is not known to physically threaten the integrity of any sacred places/TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance of traditional ceremonies and rituals pursuant to AIRFA or EO 13007. There are currently no known remains that fall within the purview of NAGPRA or ARPA that are threatened by leasing. Use of lease notices/stipulations and other design features, such as Native American consultation (including Navajo Nation Chapters) and cultural resource avoidance will help ensure that new information is incorporated and taken into account during individual lease development analysis and authorizations.

**World Heritage Sites**

None of the parcels are physically within 5 miles of any World Heritage Site and based on a viewshed analysis, none are visible within 0-15 miles (e.g. foreground-middle ground-background). All the Navajo parcels are approximately 5.5 – 11.5 miles from the Pueblo Pintado unit of Chaco Culture NHP.

**Old Spanish National Historic Trail**

The trail does not physically intersect with any of the parcels. Based on a viewshed analysis, portions of the parcels, particularly parcels 9, 12, 13, are visible from within 0-5 miles (e.g.

foreground-middle ground) of the OST. Until site specific development is proposed it is not possible to fully assess the effects. At that point additional viewshed analysis can be conducted and design features/mitigation measures implemented, if needed (e.g. project relocation, low profile equipment, tree screens, contrast reducing paint schemes). Leasing will not substantially interfere with the Old Spanish National Historic Trail.

**Night Skies**

Light sources associated with drilling an oil and gas well include a light plant or generator, a light on the top of the rig, vehicle traffic, and flaring. The number of light sources and the duration of each source are identified in Table 6. Flaring could occur in locations where pipelines are not available to transport gas to sale; however, the necessity for flaring and the duration of flaring varies widely from well to well and is difficult to predict.

**Table 6. Light Sources by Lease Parcel under the Proposed Alternative**

| Light Source | | | Duration | |
|---|---|---|---|---|
| **Location** | **Type** | **Number[1]** | **Days (average)** | **Hours[2]** |
| **Foreground/Middleground (0-5 miles)** | | | | |
| **Estimated light sources per 1 well** | | | | |
| Rig Derrick | 4-foot Fluorescent (1 Explosion Proof) | 12 | 3 | 24 |
| Light Tower | Explosion Proof | 4 | 3 | 24 |
| Light Tower | Explosion Proof | 2 | 30 | 24 |
| Rig Floor | Explosion Proof | 2 | 17 | 24 |
| Sub | Explosion Proof | 4 | 17 | 24 |
| Mud Tank | Explosion Proof | 9 | 17 | 24 |
| Mud Pump | Explosion Proof | 6 | 17 | 24 |
| Catwalk | Explosion Proof | 2 | 17 | 24 |
| Tool Shed | 4-foot Fluorescent | 4 | 17 | 24 |
| Housing Unit | 12-Volt | 10 | 17 | 12 |
| **Background/Seldom Seen (greater than 5 miles)** | | | | |
| **Estimated light sources per 1 well** | | | | |
| Rig Derrick | 4-foot Fluorescent (1 Explosion Proof) | 12 | 3 | 24 |
| Light Tower | Explosion Proof | 4 | 3 | 24 |
| Light Tower | Explosion Proof | 2 | 30 | 24 |
| Rig Floor | Explosion Proof | 2 | 17 | 24 |
| Sub | Explosion Proof | 4 | 17 | 24 |
| Mud Tank | Explosion Proof | 9 | 17 | 24 |
| Mud Pump | Explosion Proof | 6 | 17 | 24 |
| Catwalk | Explosion Proof | 2 | 17 | 24 |
| Tool Shed | 4-foot Fluorescent | 4 | 17 | 24 |
| Housing Unit | 12-Volt | 10 | 17 | 12 |
| **Estimated light sources per 1 well** | | | | |
| Rig Derrick | 4-foot Fluorescent (1 Explosion Proof) | 12 | 3 | 24 |
| Light Tower | Explosion Proof | 4 | 3 | 24 |
| Light Tower | Explosion Proof | 2 | 30 | 24 |
| Rig Floor | Explosion Proof | 2 | 17 | 24 |
| Sub | Explosion Proof | 4 | 17 | 24 |
| Mud Tank | Explosion Proof | 9 | 17 | 24 |
| Mud Pump | Explosion Proof | 6 | 17 | 24 |
| Catwalk | Explosion Proof | 2 | 17 | 24 |
| Tool Shed | 4-foot Fluorescent | 4 | 17 | 24 |

| | | | | |
|---|---|---|---|---|
| Housing Unit | 12-Volt | 10 | 17 | 12 |

[1] The number reflects the total number of light sources that may be required to drill wells necessary to develop the parcel. The total number of light sources present at any given time is likely to be lower as is unlikely that all wells will be drilled at the same time.

[2] This number reflects the number of hours the light may be on during a 24-hour period. Because the number of night-time hours varies depending on the time of year the well is drilled, lighting will not impact night skies during all of the hours identified.

The table provides the total number of light sources required for the development of a well; however, for parcels requiring more than one well, it is unlikely that all of the wells would be drilled at one time. These activities could result in minor, short-term impacts to night skies as well locations typically do not have lighting as a permanent feature upon completion.

**Water Resources**

Hydraulic fracturing is a common process in the San Juan Basin and applied to nearly all wells drilled. There are no verified instances of hydraulic fracturing adversely affecting groundwater in the San Juan Basin (USDI/BLM 2011*a*, page 54). The producing zone targeted by both action alternatives is well below any underground sources of drinking water. Typical depth of water wells in the San Juan Basin is 500 feet or less. The Mancos Shale formation is also overlain by a continuous confining layer. On average, total depth of each well bore would be 6,700 feet below the ground surface. Fracturing in the Basin Mancos formation is not expected to occur above depths above 5,700 feet below the ground surface. Fracturing could possibly extend into the Mesaverde formation overlying the Basin Mancos; however, the formation has not been identified as an underground source of drinking water based on its depth and relative high levels of TDS.

Hydraulic fracturing fluid is roughly 99 percent water but also contains numerous chemical additives as well as propping agents, such as sands. Chemicals added to stimulation fluids include friction reducers, surfactants, gelling agents, scale inhibitors, acids, corrosion inhibitors, antibacterial agents, and clay stabilizers. Stimulation techniques have been used in the United States since 1949 and in the San Juan Basin since the 1950s. Over the last 10 years, advances in multi-stage and multi-zone hydraulic fracturing has allowed development of gas fields that previously were uneconomic, including the San Juan Basin.

The water used for hydraulic fracturing in the Farmington Field Office generally comes from permitted groundwater wells, although surface water sources may occasionally be used. Because large volumes of water are needed for hydraulic fracturing, the use of groundwater for this purpose might contribute to the drawdown of groundwater aquifer levels. Groundwater use is permitted and managed by the New Mexico Office of the State Engineer, and these water rights have already been designated. In addition, the use of water for hydraulic fracturing is one of many uses of groundwater in the Farmington Field Office. Other uses include irrigation, industrial mining operations, and domestic and livestock use.

Contamination of groundwater could occur without adequate cementing and casing of the proposed well bore. Casing specifications are designed and submitted to the BLM. The BLM independently verifies the casing program, and the installation of the casing and cementing operations are witnessed by certified Petroleum Engineering Technicians. Surface casing setting depth is determined by regulation. Adherence to APD COAs and other design measures would

minimize potential effects to groundwater quality. The potential for impacts to groundwater from the well bores would be long term for the life of the wells.

There would be the potential for accidental spills or releases of these materials, which could impact local water quality. The potential for surface water quality impacts from accidental spills or releases of hazardous materials on the well pads would be long term for the life of the wells.

**Soil**

While the act of leasing a tract would produce no direct impacts under the action alternatives, subsequent development of the lease would physically disturb the topsoil and would expose the substratum soil on subsequent project areas. Direct impacts resulting from the oil and gas construction of well pads, access roads, and reserve pits include removal of vegetation, exposure of the soil, mixing of horizons, compaction, loss of top soil productivity and susceptibility to wind and water erosion. Wind erosion would be expected to be a minor contributor to soil erosion with the possible exception of dust from vehicle traffic. These impacts could result in increased indirect impacts such as runoff, erosion and off-site sedimentation. Activities that could cause these types of indirect impacts include construction and operation of well sites, access roads, gas pipelines and facilities.

Contamination of soil from drilling and production wastes mixed into soil or spilled on the soil surfaces could cause a long-term reduction in site productivity. Some of these impacts can be reduced or avoided through proper design, construction and maintenance and implementation of best management practices.

Additional soil impacts associated with lease development would occur when heavy precipitation causes water erosion damage. When water saturated segment(s) on the access road become impassable, vehicles may still be driven over the road. Consequently, deep tire ruts would develop. Where impassable segments are created from deep rutting, unauthorized driving may occur outside the designated route of access roads.

The impact to the soil would be remedied upon reclamation of well pads when the stockpiled soil that was specifically conserved to establish a seed bed is spread over well pads and vegetation re-establishes.

Fragile soils may be difficult for the project proponent to stabilize and establish vegetation. The proponent is required to follow the FFO Bare Soil Reclamation Procedure (procedure) for all projects that result in bare soil in areas of 0.1 acre or more that have an onsite visit after February 5, 2013. The procedure utilizes 8 habitat community descriptions; each community description contains recommendations for effective reclamation. Some additional recommendations for fragile soils include:

- Provide temporary stabilization of disturbed areas that are not actively under construction.
- Apply erosion controls such as excelsior netting, geotextile materials, silt fences, and silt traps to prevent/minimize soil erosion from vehicular traffic and during construction activities.

- Minimize the amount of land disturbed as much as possible and minimize vegetation removal.
- Design runoff control features to minimize soil erosion.

Regulations and policy require a project proponent to submit a plan for surface reclamation, and the FFO Bare Soil Reclamation Procedure requires a revegetation plan to be incorporated into the site specific project EA. FFO reviews permit applications and site specific project EAs for adequate plans for soil stabilization and revegetation for all proposed projects, including proposed projects located on fragile soils.

**Special Status Species**

## USFWS Threatened or Endangered Species

The action alternatives may not be in compliance with the 2002 Biological Assessment for the 2003 BLM/FFO RMP (Cons. #2-22-01-I-389). Consultation under ESA with the USFWS may be required at the Application to Drill stage. Parcel # 35 (NM-201410-035) is within habitat of two federally-listed plant species. Any proposed project within this proposed lease (# 35) would likely require a biological assessment and consultation of the Endangered Species Act. Biological surveys will be required prior to any proposed project that may affect a federally-listed species. The results of the biological survey will determine if a biological assessment and consultation with USFWS is required.

## Other Special Status Species

A review of the GIS data indicates there may be some concern with SMS plant species and other special status species relative to the proposed lease sale parcels. In 2012, a new habitat area for Brack's cactus was discovered in the southern portion of the BLM/FFO management area near Counselor, NM, within the nacimiento geological formation. The BLM/FFO is planning to collect data to thoroughly map this new habitat area. Currently, biological surveys, including plant surveys, are required within this nacimiento habitat for ground disturbing projects. Management prescriptions for this new Brack's cactus habitat area are applied to occupied habitat, as written within the BLM/FFO Interim Guidance (IM-NMF000-20014-010). The proposed action has eleven (11) proposed parcels that may fall within Brack's cactus habitat; Parcels 17-19, 25-31 and 33. The BLM/FFO requires specific plant surveys within these parcels for ground-disturbing projects and will apply mitigation to reduce impacts to this species. Aztec gilia has been known to occur within the same habitatas. To date, no Aztec gilia has been found within this new habitat area. Surveys for Aztec gilia are currently required within nacimiento habitat (new habitat area).

No other special status species is expected to be directly impacted by the action alternatives. The proposed parcels may include undocumented Gunnison's prairie dog towns, burrowing owls, golden eagles, prairie and peregrine falcons and ferruginous hawks, all SMS and BLM Sensitive Species. Prairie dog towns are nesting habitat for burrowing owls, as well as, important foraging areas for raptors and other predator species. Project specific analysis will be conducted on any new ground disturbing activity to eliminate or minimize impacts to these species. Management

measures, as written in the FFO Special Management Species policy, will apply to the proposed new lease parcels.

In addition, special status species may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. However, these impacts would be reduced significantly with BLM/FFO's timing stipulations that protects raptors (incl burrowing owls) during the nesting season. No proposed project activity can negatively impact the breeding and nesting activities of any raptors.

**Wildlife**

The types and extent of impacts expected from oil and gas development to wildlife species and habitats from development are similar to those described in the 4.9 Special Status Species Section. Although reclamation and restoration efforts for surface disturbance could provide for the integrity of other resources, these efforts may not always provide the same habitat values (e.g. structure, composition, cover, etc.) in the short or in some instance, the long-term in complex vegetative community types (e.g., shrub oak communities). The short-term negative impact to wildlife would occur during the construction phase of the operation due to noise and habitat destruction under the action alternatives. In addition, wildlife may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks.

In general, most wildlife species would become habituated to the new facilities. For other wildlife species with a low tolerance to activities, the operations on the well pad would continue to displace wildlife from the area due to ongoing disturbances such as vehicle traffic, noise and equipment maintenance. The conditions of approval would alleviate most losses of wildlife species, such as; fencing the reserve pits, netting storage tanks, installation or other modifications of cones on separator stacks, and timing stipulations. The magnitude of above effects would be dependent on the rate and location of the oil and gas development, but populations could likely not recover to pre-disturbance levels until the activity was completed and the vegetative community restored.

**Migratory Birds**

Potential effects on birds from the action alternatives are difficult to predict. Ongoing studies have shown mixed effects of oil and gas development, including compressor noise on nesting migratory birds. Frances and Ortega (2006 unpublished report to BLM/FFO) found no significant difference in nest density or nest success between sites with or without wellhead compressors. Some species, such as black-chinned hummingbird (*Archilocus alexandri*) and house finch (*Carpodacus erythrinus*), were more common on sites with compressors while others, such as mourning dove (*Zenaida macroura*) and spotted towhee (*Pipilo erythrophthalmus*), appeared to either avoid or nest further from compressors. Holmes *et al.* (2003) found that sage sparrow had lower nest survival in an area with ongoing gas development,

while Brewer's sparrow (*Spizella breweri*) had higher survival rates when compared with populations in an undeveloped control area.

Site-specific analysis will be conducted to determine the impacts on migratory birds as proposed projects are submitted to the BLM The BLM/FFO bird policy requires migratory bird nest surveys for any proposed project (and related activities) with new disturbance that exceeds 4.0 acres. The bird policy also has other protective measures to reduce bird risks once a project is completed (Instruction Memorandum No. 2013-033). Impacts to migratory birds will be reduced significantly with these management measures in place. However, not all impacts will be eliminated. Impacts such as habitat fragmentation and habitat loss will continue to impact birds and their habitat. The BLM/FFO will apply Best Management Practices (BMPs) to reduce impacts on migratory birds. Examples of these BMPs can be found in the BLM/FFO bird policy and the MOU between USFWS and BLM (DOI 2010a).

**Environmental Justice**

While the act of leasing federal minerals itself would result in no social impacts, subsequent development of a lease may generate impacts to people living near or using the area in the vicinity of the lease. Oil and gas exploration, drilling, or production could create a disruption to these people due to increased traffic and traffic delays, air pollution, noise and visual impacts. This could be especially noticeable in rural areas where oil and gas development has been minimal. The amount of disruption would depend on the activity affected, traffic patterns within the area, noise levels, length of time, and season these activities occurred. In addition, any nearby residents may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the period of time during which drilling operations associated with hydraulic fracturing occur.

Creation of new access roads into an area could allow increased public access and exposure of private property to vandalism. For leases where the surface is privately owned and the subsurface is BLM managed, surface owner agreements, standard lease stipulations, and BMPs could address many of the concerns of private surface owners.

Employment and associated population increases would be more likely to occur in the larger communities where the social effects would be less noticeable. Any new employment and population would probably be welcomed in the very small communities that are currently losing population. There would also be an increase in revenues that accrue to the counties where production occurs. Depending on where production actually occurs, these revenues would benefit any receiving county but would be more notable in counties with smaller populations and lower current property and tax revenue.

CUMULATIVE IMPACTS

The NMSO manages approximately 41 million acres of Federal mineral estate. Of the 41 million acres, 35 million acres are available for oil and gas leasing. Approximately 17% of the 35 million acres is currently leased (73% of the leases are in production and 63% of the lease acres are in production). The NMSO received 151 parcel nominations (92,147.63 acres) for consideration in

the July 2013 Oil & Gas Lease Sale, and is proposing to lease 68 (30,820.16 acres) of the 151 parcels. If these 68 parcels were leased, the percentage of Federal minerals leased would not change. The Carlsbad, Roswell, Las Cruces, and Oklahoma Field Office (Oklahoma and Texas) parcels are analyzed under separate EAs.

**Table 7. Actual - Acres of Federal Minerals/Acres Available/Acres Leased**

| State | Federal O&G Mineral Ownership | Acres Available | Acres Leased | Percent Leased |
|---|---|---|---|---|
| KS | 744,000 | 614,586 | 125,091 | 20% |
| NM | 34,774,457 | 29,751,242 | 4,839,255 | 16% |
| OK | 1,998,932 | 1,668,132 | 324,072 | 19% |
| TX | 3,404,298 | 3,013,207 | 425,511 | 14% |
| Totals/Average | 40,921,687 | 35,058,167 | 5,713,929 | 16% |

**Table 8. Parcels Nominated & Offered in the January 2014 Oil & Gas Lease Sale:**

| Field Office | No. of Nominated Parcels | Acres of Nominated Parcels | No. of Parcels to be Offered | Acres of Parcels to be Offered |
|---|---|---|---|---|
| Farmington | 35 | 27,132.47 | 25 | 23,325.4 |

**Table 9. Foreseeable - Acres of Federal Minerals/Acres Available/Acres Leased:**

| State | Federal O&G Mineral Ownership | Acres Available | Acres Leased | Percent Leased |
|---|---|---|---|---|
| KS | 744,000 | 614,586 | 125,091 | 20% |
| NM | 34,774,457 | 29,751,242 | 4,866,387 | 16% |
| OK | 1,998,932 | 1,668,132 | 324,072 | 19% |
| TX | 3,404,298 | 3,013,207 | 425,511 | 14% |
| Totals/Average | 40,921,687 | 35,058,167 | 5,741,061 | 16% |

The cumulative impacts fluctuate with the gradual reclamation of well abandonments and the creation of new additional surface disturbances in the construction of new access roads and well pads. The on-going process of restoration of abandonments and creating new disturbances for drilling new wells gradually accumulates as the minerals are extracted from the land. Preserving as much land as possible and applying appropriate mitigation measures will alleviate the cumulative impacts.

### Effects on Air Resources

The following analysis of cumulative impacts of the proposed action on air quality will be limited to the Four Corners area of New Mexico. The cumulative impacts of GHG emissions and their relationship to climate change are evaluated at the national and global levels in the Air Resources Technical Report (U.S. Department of Interior Bureau of Land Management, 2014).

### Effects of Other Past, Present, and Reasonably Foreseeable Actions on Air Resources

The primary activities that contribute to levels of air pollutant and GHG emissions in the Four Corners area are electricity generation stations, fossil fuel industries and vehicle travel. The Air Resources Technical Report includes a description of the varied sources of national and regional emissions that are incorporated here to represent the past, present and reasonably foreseeable impacts to air resources. It includes a summary of emissions on the national and regional scale by industry source. Sources that are considered to have notable contributions to air quality impacts and GHG emissions include electrical generating units, fossil fuel production (nationally and regionally) and transportation.

**Cumulative Effects of the Proposed Action on Air Quality**

The very small increase in emissions that could result from approval of the proposed action would not result in any county in the FFO area exceeding the NAAQS for any criteria pollutants. The applicable regulatory threshold for HAPs is the oil and gas industry National Emissions Standards for Hazardous Air Pollutants, which are currently under review by the EPA. The emissions from any wells drilled in the leased areas are not expected to impact the 8-hour average ozone concentrations, or any other criteria pollutants in the Southern San Juan Basin.

**Cumulative Effects of the Proposed Action on Climate Change**

The very small increase in GHG emissions that could result from approval of the proposed action would not produce climate change impacts that differ from the No Action Alternative. This is because climate change is a global process that is impacted by the sum total of GHGs in the Earth's atmosphere. The incremental contribution to global GHGs from the proposed action cannot be translated into effects on climate change globally or in the area of this site-specific action. It is currently not feasible to predict with certainty the net impacts from the proposed action on global or regional climate.

The Air Resources Technical Report discusses the relationship of past, present and future predicted emissions to climate change and the limitations in predicting local and regional impacts related to emissions. It is currently not feasible to know with certainty the net impacts from particular emissions associated with activities on public lands.

## CONSULTATION/COORDINATION

This section includes individuals or organizations from the public, external agencies, the interdisciplinary (ID) team that was contacted during the development of this document.

**Table 10. List of Preparers**

| ID Team Member | Title | Organization |
|---|---|---|
| Jim Copeland | Archaeologist | BLM |
| John Kendall | T & E Biologist | BLM |
| Sarah Scott | Natural Resource Specialist | BLM |
| Dave Mankiewicz | Assistant Field Manager, Minerals | BLM |
| Jeff Tafoya | Range Management Specialist | BLM |
| Lindsey Eoff | Project Manager | BLM |
| Janelle Alleman | Outdoor Planner | BLM |
| John Hansen | Wildlife Biologist | BLM |
| Amanda Nisula | Planning & Environmental Coordinator | BLM |
| Dale Wirth | Range & Multiple Resource-Branch Chief | BLM |
| Stan Dykes | Weeds | BLM |
| Sherrie Landon | Paleontologist | BLM |

### Agencies, Persons and Organizations Consulted

Agencies
Michael Davis, US Forest Service
Matt Wunder, NM Dept. of Game & Fish Chief Conservation Services Division
New Mexico State Historic Preservation Officer, State of New Mexico Department of Cultural Affairs Historic Preservation Division
National Park Service-Chaco Culture National Historical Park
National Park Service -National Trails Intermountain Region

New Mexico State Office
Rebecca Hunt, State Natural Resource Specialist
Dave Goodman, State Office NEPA Coordinator
Mary Uhl, State Office Air Resources Specialist

On March 18, 2014 a briefing for the BLM NM State Director was held at the New Mexico State Office to review Field Office recommendations for nominated parcels.

Tribes
Navajo Nation Historic Preservation Officer and eight potentially affected chapters
Nageezi, Counselor, Hogback, Nenahnezad/San Juan, Upper Fruitland, Ojo Encino, Torreon, Pueblo Pintado
Jicarilla Apache Nation
Ute Mountain Ute Tribe
Southern Ute Tribe
Zia
Zuni
Jemez

Acoma
Hopi

NGOs
National Trust for Historic Preservation
Chaco Alliance
Old Spanish Trail Association

**Public Involvement**

The nominated parcels for this sale, along with the appropriate stipulations from the RMP were posted online for a two week scoping period beginning March 10 through March 24, 2014. Scoping comments were received from Amigos Bravos, The State of New Mexico Department of Cultural Affairs Historic Preservation Division, the Hopi Tribe, Counselor Chapter, Ojo Encino Chapter, Western Environmental Law Center, San Juan Citizens Alliance (SJCA), Old Spanish Trail Association (OSTA), and numerous private citizens. This EA will be made available for public review and comment for 30 days beginning May 1, 2014.

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## Appendix 1: Phases of Oil and Gas Development

### Construction Activities

Clearing of the proposed well pad and access road would be limited to the smallest area possible to provide safe and efficient work areas for all phases of construction. First all new construction areas need to be cleared of all vegetation. All clearing activities are typically accomplished by cutting, mowing and/or grading vegetation as necessary. Cut vegetation may be mulched and spread on site or hauled to a commercial waste disposal facility.

Next, heavy equipment including but not limited to bulldozers, graders, front-end loaders, and/or track hoes are used to construct at a minimum the pad, but other features, as needed for development, may include, but is not limited to an access road, reserve pit, pipeline, and/or fracturing pond. Cut and fills may be required to level the pad or road surfaces. If a reserve pit is authorized, it would be lined using an impermeable liner or other lining mechanism (i.e. bentonite or clay) to prevent fluids from leeching into the soil. Access roads may have cattle guards, gates, drainage control, or pull-outs installed, among a host of other features that may be necessary based on the site specific situation. Long-term surfaces are typically dressed with a layer of crushed rock or soil cemented. Construction materials come from a variety of sources. Areas not needed for long-term development (i.e. portions of the pipeline or road right-of-way) are reclaimed by recontouring the surface and establishing vegetation.

If a pipeline is needed, the right-of-way would be cleared of all vegetation. The pipeline would be laid out within the cleared section. A backhoe, or similar piece of equipment, would dig a trench at least 36 inches below the surface. After the trench is dug, the pipes would be assembled by welding pieces of pipe together and bending them slightly, if necessary, to fit the contour of the pipeline's path. Once inspected, the pipe can be lowered into the trench and covered with stockpiled subsoil that was originally removed from the hole. Each pipeline undergoes hydrostatic testing prior to natural gas being pumped through the pipeline. This ensures the pipeline is strong enough and absent of any leaks.

### Drilling Operations

When the pad is complete, the drilling rig and associated equipment would be moved onsite and erected. A conventional rotary drill rig with capability matched to the depth requirements of the proposed well(s) would be used. The well could be drilled as a vertical or horizontal well to target the desired formation. The depth of the well is entirely dependent on the target formation depth and could be several hundred feet vertical depth to over 20,000 feet vertical depth.

When a conventional reserve pit system is proposed, drilling fluid or mud is circulated through the drill pipe to the bottom of the hole, through the bit, up the bore of the well, and finally to the surface. When mud emerges from the hole, it enters into the reserve pit where it would remain until all fluids are evaporated and the solids can be buried.

A closed-loop system, operates in a similar fashion except that when the mud emerges from the hole, it passes through a series of equipment used to screen and remove drill cuttings (rock chips) and sand-sized

solids rather than going into the pit. When the solids have been removed, the mud would be placed into holding tanks, and from the tank, used again.

In either situation the mud is maintained at a specific weight and viscosity to cool the bit, seal off any porous zones (thereby protecting aquifers or preventing damage to producing zone productivity), control subsurface pressure, lubricate the drill string, clean the bottom of the hole, and bring the drill cuttings to the surface. Water-based or oil-based muds can be used and is entirely dependent on the site-specific conditions.

## Completion Operations

Once a well has been drilled, completion operations would begin once crews and equipment are available. Well completion involves setting casing to depth and perforating the casing in target zones.

Wells are often treated during completion to improve the recovery of hydrocarbons by increasing the rate and volume of hydrocarbons moving from the natural oil and gas reservoir into the wellbore. These processes are known as well-stimulation treatments, which create new fluid passageways in the producing formation or remove blockages within existing passageways. They include fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other.

### *Hydraulic Fracturing*

Hydraulic fracturing (HF) is one technological key to economic recovery of oil and gas that might have been left by conventional oil and gas drilling and pumping technology. It is a formation stimulation practice used to create additional permeability in a producing formation, thus allowing gas to flow more readily toward the wellbore. Hydraulic fracturing can be used to overcome natural barriers, such as naturally low permeability or reduced permeability resulting from near wellbore damage, to the flow of fluids (gas or water) to the wellbore (GWPC 2009). The process is not new and has been a method for additional oil and gas recovery since the early 1900s; however, with the advancement of technology it is more commonly used.

Hydraulic fracturing is a process that uses high pressure pumps to pump fracturing fluid into a formation at a calculated, predetermined rate and pressure to generate fractures or cracks in the target formation. For shale development, fracture fluids are primarily water-based fluids mixed with additives which help the water to carry proppants into the fractures, which may be made up of sand, walnut hulls, or other small particles of materials. The proppant is needed to "prop" open the fractures once the pumping of fluids has stopped. Once the fracture has initiated, additional fluids are pumped into the wellbore to continue the development of the fracture and to carry the proppant deeper into the formation. The additional fluids are needed to maintain the downhole pressure necessary to accommodate the increasing length of opened fracture in the formation.

Hydraulic fracturing of horizontal shale gas wells is performed in stages. Lateral lengths in horizontal wells for development may range from 1,000 feet to more than 5,000 feet. Depending on the lengths of the laterals, treatment of wells may be performed by isolating smaller portions of the lateral. The

fracturing of each portion of the lateral wellbore is called a stage. Stages are fractured sequentially beginning with the section at the farthest end of the wellbore, moving uphole as each stage of the treatment is completed until the entire lateral well has been stimulated.

This process increases the flow rate and volume of reservoir fluids that move from the producing formation into the wellbore. The fracturing fluid is typically more than 99 percent water and sand, with small amounts of readily available chemical additives used to control the chemical and mechanical properties of the water and sand mixture (see discussion about Hazardous and Solid Wastes below). Because the fluid is composed mostly of water, large volumes of water are usually needed to perform hydraulic fracturing. However, in some cases, water is recycled or produced water is used.

Before operators or service companies perform a hydraulic fracturing treatment, a series of tests is performed. These tests are designed to ensure that the well, casing, well equipment, and fracturing equipment are in proper working order and will safely withstand the application of the fracture treatment pressures and pump flow rates.

To ensure that hydraulic fracturing is conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance on Federal public lands. Operators must submit Applications for Permit to Drill (APDs) to the agency. Prior to approving an APD, a BLM OFO geologist identifies all potential subsurface formations that would be penetrated by the wellbore. This includes all groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures.

Once the geologic analysis is completed, the BLM reviews the company's proposed casing and cementing programs to ensure the well construction design is adequate to protect the surface and subsurface environment, including the potential risks identified by the geologist and all known or anticipated zones with potential risks.

During drilling, the BLM is on location during the casing and cementing of the ground water protective surface casing and other critical casing and cementing intervals. Before hydraulic fracturing takes place, all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. If the fracturing of the well is considered to be a "non-routine" fracture for the area, the BLM would always be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

### Production Operations

Production equipment used during the life of the well may include a 3-phase separator-dehydrator; flow-lines; a meter run; tanks for condensate, produced oil, and water; and heater treater. A pump jack may be required if the back pressure of the well is too high. Production facilities are arranged to facilitate safety and maximize reclamation opportunities. All permanent above-ground structures not subject to safety considerations are painted a standard BLM or company color or as landowner specified.

Workovers may be performed multiple times over the life of the well. Because gas production usually declines over the years, operators perform workover operations which involve cleaning, repairing and maintaining the well for the purposes of increasing or restoring production.

## Hazardous or Solid Wastes Associated with Oil and Gas Development

Anticipated use or produced hazardous materials during the development may come from drilling materials; cementing and plugging materials; HF materials; production products (natural gas, condensates, produced water); fuels and lubricants; pipeline materials; combustion emissions; and miscellaneous materials. Appendix 1, Table 1 includes some of the common wastes (hazardous and non-hazardous) that are produced during oil and gas development.

**Appendix 1, Table 1. Common wastes produced during oil and gas development.**

| Phase | Waste |
|---|---|
| Construction | • Domestic wastes (i.e. food scraps, paper, etc.)<br>• Excess construction materials<br>• Used lubricating oils<br>• Solvents<br>• Woody debris<br>• Paints<br>• Sewage |
| Drilling | • Drilling muds, including additives (i.e. chromate and barite) and cuttings<br>• Well drilling, completion, workover, and stimulation fluids (i.e. oil derivatives such as polycyclic aromatic hydrocarbons (PAHs), spilled chemicals, suspended and dissolved solids, phenols, cadmium, chromium, copper, lead, mercury, nickel)<br>• Equipment, power unit and transport maintenance wastes (i.e. batteries; used filters, lubricants, oil, tires, hoses, hydraulic fluids; paints; solvents)<br>• Fuel and chemical storage drums and containers<br>• Cementing wastes<br>• Production testing wastes<br>• Excess construction materials<br>• Scrap metal<br>• Sewage<br>• Rigwash<br>• Excess drilling chemicals<br>• Processed water<br>• Contaminated soil<br>• Domestic wastes |
| HF | See below |
| Production | • Power unit and transport maintenance wastes (i.e. batteries; used filters, lubricants, filters, tires, hoses, coolants, antifreeze; paints; solvents, used parts)<br>• Discharged produced water<br>• Production chemicals<br>• Workover wastes (e.g. brines)<br>• Tank or pit bottoms<br>• Contaminated soil<br>• Scrap metal |
| Abandonment/Reclamation | • Construction materials<br>• Decommissioned equipment<br>• Contaminated soil<br>• Insulating materials<br>• Sludge |

***Hydraulic Fracturing***

Chemicals serve many functions in hydraulic fracturing, from limiting the growth of bacteria to preventing corrosion of the well casing. Chemicals are needed to insure the hydraulic fracturing job is effective and efficient. The fracturing fluids used for shale stimulations consist primarily of water but also include a variety of additives. The number of chemical additives used in a typical fracture treatment varies depending on the conditions of the specific well being fractured. A typical fracture treatment will use very low concentrations of between 3 and 12 additive chemicals depending on the characteristics of the water and the shale formation being fractured. Each component serves a specific, engineered purpose. The predominant fluids currently being use for fracture treatments in the shale gas plays are water-based fracturing fluids mixed with friction-reducing additives, also known as slickwater (GWPC 2009).

**Figure 1. Typical Chemical Additives Used In Fracturing Fluids (GWPC 2009)**

| Compound | Purpose | Common application |
|---|---|---|
| Acids | Helps dissolve minerals and initiate fissure in rock (pre-fracture) | Swimming pool cleaner |
| Sodium Chloride | Allows a delayed breakdown of the gel polymer chains | Table salt |
| Polyacrylamide | Minimizes the friction between fluid and pipe | Water treatment, soil conditioner |
| Ethylene Glycol | Prevents scale deposits in the pipe | Automotive anti-freeze, deicing agent, household cleaners |
| Borate Salts | Maintains fluid viscosity as temperature increases | Laundry detergent, hand soap, cosmetics |
| Sodium/Potassium Carbonate | Maintains effectiveness of other components, such as crosslinkers | Washing soda, detergent, soap, water softener, glass, ceramics |
| Glutaraldehyde | Eliminates bacteria in the water | Disinfectant, sterilization of medical and dental equipment |
| Guar Gum | Thickens the water to suspend the sand | Thickener in cosmetics, baked goods, ice cream, toothpaste, sauces |
| Citric Acid | Prevents precipitation of metal oxides | Food additive; food and beverages; lemon juice |
| Isopropanol | Used to increase the viscosity of the fracture fluid | Glass cleaner, antiperspirant, hair coloring |

The make-up of fracturing fluid varies from one geologic basin or formation to another. Because the make-up of each fracturing fluid varies to meet the specific needs of each area, there is no one-size-fits-all formula for the volumes for each additive. In classifying fracture fluids and their additives it is important to realize that service companies that provide these additives have developed a number of compounds with similar functional properties to be used for the same purpose in different well environments. The difference between additive formulations may be as small as a change in concentration of a specific compound (GWPC 2009).

Typically, the fracturing fluids consist of about 99 percent water and sand and about 1 percent chemical additives. The chemical additives are essential to the process of releasing gas trapped in shale rock and other deep underground formation.

***NORM***

Some soils and geologic formations contain low levels of radioactive material. This naturally occurring radioactive material (NORM) emits low levels of radiation, to which everyone is exposed on a daily basis. When NORM is associated with oil and natural gas production, it begins as small amounts of uranium and thorium within the rock. These elements, along with some of their decay elements, notably radium$_{226}$ and radium$_{228}$, can be brought to the surface in drill cuttings and produced water. Radon$_{222}$, a gaseous decay element of radium, can come to the surface along with the shale gas. When NORM is brought to the surface, it remains in the rock pieces of the drill cuttings, remains in solution with produced water, or,

under certain conditions, precipitates out in scales or sludges. The radiation is weak and cannot penetrate dense materials such as the steel used in pipes and tanks.

## Appendix A

## FARMINGTON FIELD OFFICE LEASE STIPULATION SUMMARY

| Stipulation | Description/Purpose |
|---|---|
| **NM-11- LN** | **LEASE NOTICE – CULTURAL RESOUCES**<br>All development activities proposed under the authority of this lease are subject to compliance with Section 106 of the NHPA and Executive Order 13007. The lease area may contain historic properties, traditional cultural properties (TCP's), and/or sacred sites currently unknown to the BLM that were not identified in the Resource Management Plan or during the lease parcel review process. Depending on the nature of the lease developments being proposed and the cultural resources potentially affected, compliance with Section 106 of the National Historic Preservation Act and Executive Order 13007 could require intensive cultural resource inventories, Native American consultation, and mitigation measures to avoid adverse effects—the costs for which will be borne by the lessee. The BLM may require modifications to or disapprove proposed activities that are likely to adversely affect TCP's or sacred sites for which no mitigation measures are possible. This could result in extended time frames for processing authorizations for development activities, as well as changes in the ways in which developments are implemented. |
| **F-15-POD** | **PLAN OF DEVELOPMENT (POD) STIPULATION**<br>A plan of development (POD) for the entire lease must be submitted for review and approval, including NEPA analysis, by the Bureau of Land Management (BLM) authorized officer, prior to approval of development (APD, Sundry Notices) actions. The POD must indicate planned access to well facilities (roads, pipelines, power lines), and the approximate location of well sites. Should it become necessary to amend the POD, the amendment must be approved prior to the approval of subsequent development action. Deviations from a current POD are not authorized until an amended POD has been approved by BLM. |
| **F-41-LN** | **LEASE NOTICE - BIOLOGICAL SURVEY**<br>A biological survey may be required prior to any surface disturbing activity on BLM managed lands. Proposed activities may be subject to seasonal closures within sensitive species habitat. Federal land management agencies are mandated to manage special status species so they should not need to be listed under Endangered Species Act (ESA) in the future. |
| **WO-ESA-7** | **ENDANGERED SPECIES ACT-**<br>**SECTION 7 CONSULTATION STIPULATION**<br>The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to |

| | |
|---|---|
| | result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation. |
| **F-4-TLS** | **SEASONAL WILDLIFE HABITAT**<br>No Surface use is allowed from December 1, through March 31, this does not apply to operations and maintenance of production facilities. This stipulation may be waived, excepted, or modified by BLM, if such action is consistent with the Resource Management Plan. The intent of the seasonal closure is to reduce the amount of wildlife disturbance during critical periods of a big game animal's life process such as fawning/calving and over wintering. |
| **F-46-CSU** | **CONTROLLED SURFACE USE -TOPOGRAPHY**<br>Surface-disturbing such as well pad activities and related facilities are prohibited on<br>slopes 15% and greater and/or side hill cuts of more than 3 feet vertical. Maximum<br>grade on collector and arterial roads is 8% (except pitch grades not exceeding 300 feet<br>in length and 10% in grade). |
| **F-44-NSO** | **NO SURFACE OCCUPANCY-COMMUNITY & RESIDENCE**<br>No surface occupancy or use is allowed within 660 feet of any occupied residences of a community adjacent to lease parcel, to reduce impacts to the community of drilling and production activities. This stipulation may be waived, excepted, or modified by BLM, if such action is consistent with the Resource Management Plan |

**BIA-1**
**(THE NAVAJO NATION STIPULATIONS)**

1. The surface ownership of lands contained in this lease may be all or partly managed by the ~Navajo Tribe. Site specific rights-of-way clearances and/or inventories may be required prior to entry upon the surface for operation of the lease holdings. Prior contact with the Navajo Nation will be required prior to operations beginning. All applicable laws of the Navajo Nation (including tax laws, water codes, requirements of Environmental Protection Administration, etc.) shall be complied with by the lessee.
2. The Navajo Nation requires a copy of complete exploration and development data (drilling logs, seismic data, etc.) obtained by the lessee on the subject lands will be provided to the Navajo Nation at no cost. All materials data will be held confidential as described in 43 CFR 3162.8.
3. Navajo grazing rights to the surface of the lands so leased shall be protected, and the Nation's rights respecting the use of water shall be unimpaired.

4. Lessee shall not obtain water for use in drilling from Indian-owned wells, tanks, springs, or stockwater reservoirs without prior written permission from the Navajo Nation. lessee shall not drill any water wells for its use without prior written consent of the Navajo Nation and the Area Director.
5. lessee shall compensate the Navajo Nation and its grazing permittees (if any), for all surface use(s) as well as damages to crops, buildings, and other improvements of surface landowner, including loss of grazing lands, occasioned by the lessee's operations except the Lessee's control. Compensation for surface use shall be negotiated by Lessee and the Navajo Nation and will be based upon the duration of activity on the land.
6. Lessee shall not drill any well within 500 feet of any house, structure, or reservoir of water without the Navajo Nation's written consent.
7. Lessee shall bury all pipelines crossing tillable lands below plow depth unless other arrangements are made with the Navajo Nation.

8. Upon the request of the Navajo Nation or if so required by the Area Director or his authorized representative, and under the direction of the Field Manager, Bureau of Land Management, the Lessee shall condition any well drilled which does not produce oil or gas in paying quantities, but which is capable of producing water satisfactorily for domestic, agricultural, or livestock use by the Navajo Nation. Otherwise, after the expiration or termination of the lease, the Lessee shall remove all pumping equipment installed by Lessee at any well.

**BIA-3**
**NAVAJO AREA, BUREAU OF INDIAN AFFAIRS SURFACE MANAGEMENT AGENCY LEASE STIPULATIONS FOR FEDERAL OIL AND GAS LEASE OFFERING**

The pipeline will be so installed that it will not interfere with the construction and/ or development of the area for agricultural purposes and/ or operation of same in connection with the Navajo Indian Irrigation Project. Any changes or relocations found to be necessary during said construction and/ or development will be accomplished at the Company's expense.

In addition, the pipeline will be buried to a depth of 48 inches and any permanent metering and production equipment installed at the actual site will conform to "no well and/or production equipment within irrigable fields of the Navajo Indian Irrigation Project will exceed two feet above natural surface elevation and be adequately barricaded for safety." Further, if crops are planted prior to accomplishment of the pipeline work, surface damages must be negotiated with Navajo Agricultural Products Industry.

| October 2014 Lease Sale<br>Santa Fe National Forest Lease Stipulations | | | | |
|---|---|---|---|---|
| **Lease Stip No.** | **Resource** | **Lease Stipulation** | **Purpose** | **Exception** |
| **No Surface Occupancy Stipulations** | | | | |
| NSO-1 | **Slopes ≥ 40% and Unstable Soils**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 20) | No Surface Occupancy | To preclude surface-disturbing activities on steep slopes (40 percent or more) because these slopes on the forest tend to have high erosion and mass wasting hazard. Without this protection there would be a high risk of impairing long-term soil productivity and watershed conditions. | An exception, modification or waiver may be granted if onsite inspection shows that unstable or steep slopes do not exist on the specific site, or if the operator can demonstrate in a surface use plan of operations that adverse effects can be minimized and activities safely conducted without loss of long-term site productivity. A public notice and comment period is required prior to waiver, exception, or modification waiver of this stipulation. |
| NSO-2 | **Management Area L** – Designated Roadless Areas<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 20) | No Surface Occupancy | To keep surface disturbance activities outside the designated roadless recreation area is needed to protect and maintain the roadless, semi-primitive, and nonmotorized character within these special areas, which include such elements as natural integrity, natural appearance, opportunity for quiet and solitude, manageability of boundaries, and special features (ecological, geological, scenic, cultural features). | An exception, modification, or waiver may be granted if the Forest Plan designation changes so that the area is no longer classified as semi-primitive nonmotorized, or if the operator can demonstrate in a surface use plan of operations that the activity can be conducted with minimal impacts on the semi-primitive, nonmotorized characteristics within a site-specific locale. A public notice and comment period is required prior to waiver, exception, or modification waiver of this stipulation. |

| October 2014 Lease Sale<br>Santa Fe National Forest Lease Stipulations | | | | |
|---|---|---|---|---|
| **Lease Stip No.** | **Resource** | **Lease Stipulation** | **Purpose** | **Exception** |
| NSO-3 | **Heritage Resources**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 21) | No Surface Occupancy | To avoid surface disturbance activities that would result in irreversible loss of this resource within these distinct localized areas where heritage resource avoidance or data recovery are not viable options. These are significant heritage resource sites on the National Register of Historic Places that are important interpretive sites. | An exception, modification, or waiver may be granted if a site-specific surface use plan of operations demonstrates that adverse impacts to the heritage resources can be completely avoided, and clearance is obtained from the forest archeologist and State Historic Preservation Officer. A public notice and comment period is required prior to waiver, exception, or modification waiver of this stipulation. |

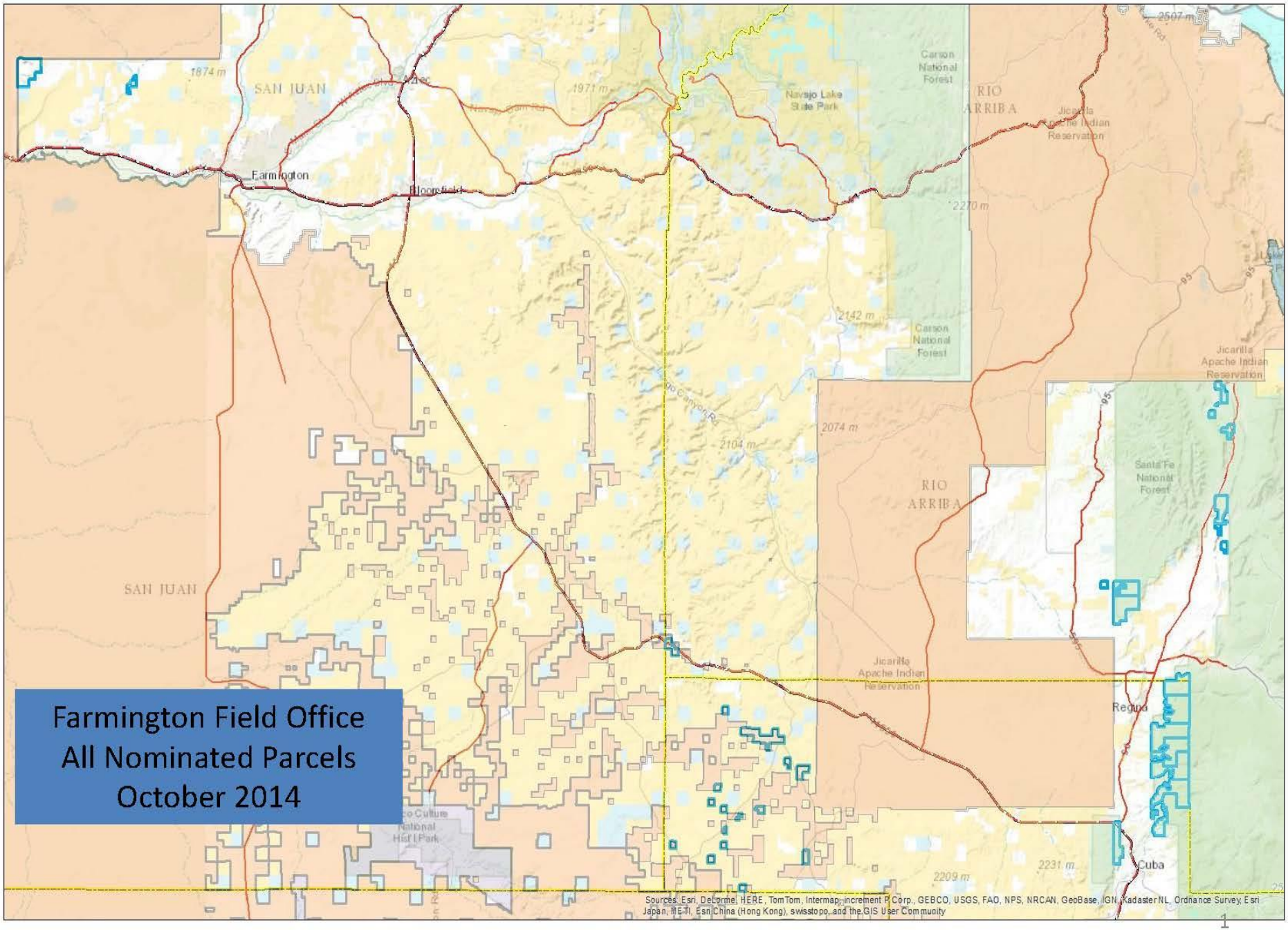
| **Controlled Surface Use Leasing Stipulations** | | | | |
|---|---|---|---|---|
| CSU-1 | **Riparian Areas and Wetlands**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 23) | Controlled Surface Use: avoid placing well pads and attendant facilities within wetlands and riparian areas. Access roads and pipelines would be allowed if there are no practical alternative locations and they are located and designed to minimize adverse impacts to riparian or wetland resources. | To avoid adverse impacts to riparian and wetland resources, consistent with law, regulation, and policy. | An exception, modification or waiver may be granted if surveys show that the area of proposed activity is not wetland or riparian, and road crossings of riparian areas may be approved if the operator can demonstrate that there are no practicable alternatives and that adverse effects of a road crossing through the riparian area or wetland can be minimized. A public notice and comment period is required prior to waiver, exception, or modification waiver of this stipulation. |

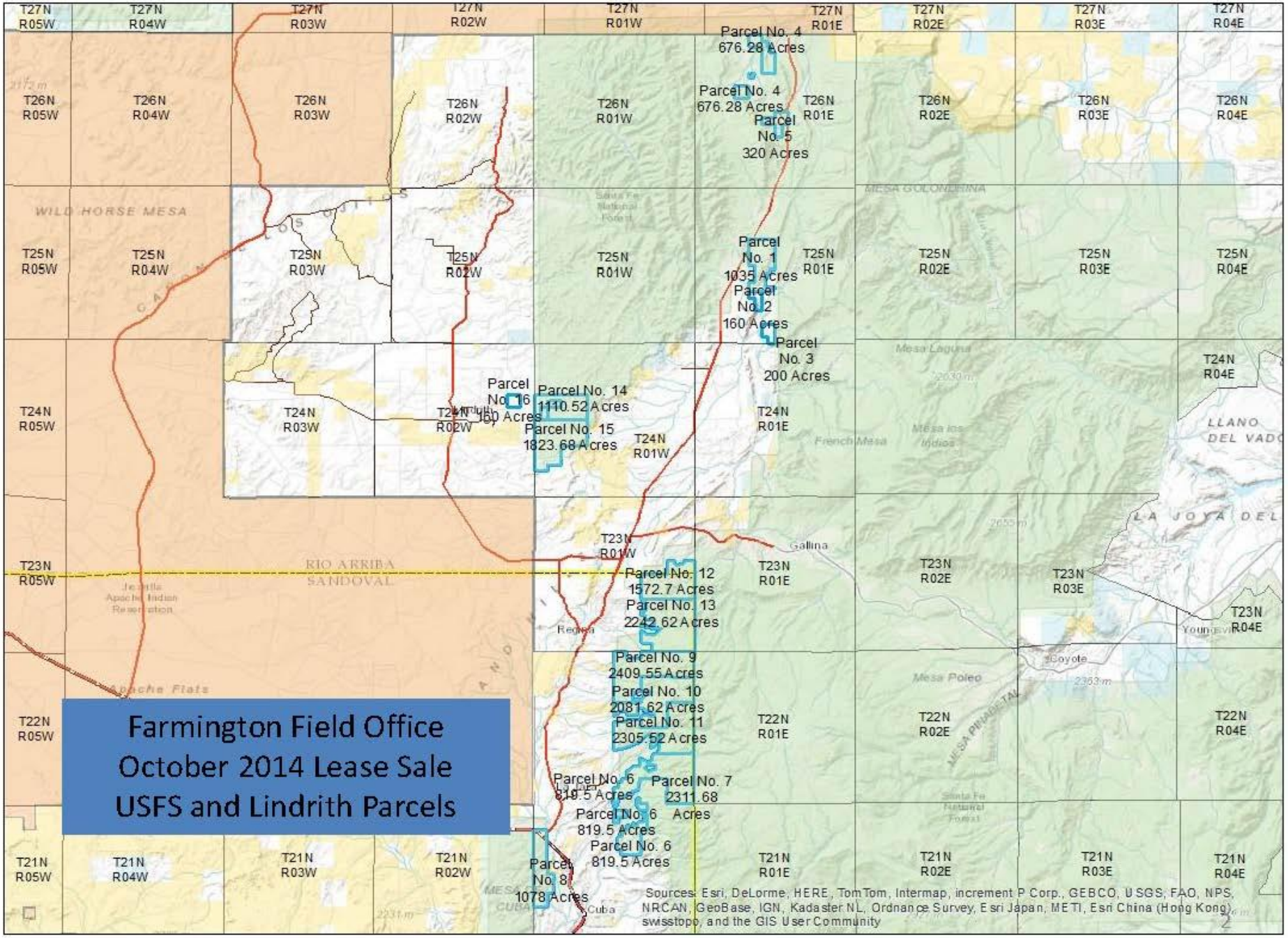
| October 2014 Lease Sale<br>Santa Fe National Forest Lease Stipulations | | | | |
|---|---|---|---|---|
| **Lease Stip No.** | **Resource** | **Lease Stipulation** | **Purpose** | **Exception** |
| CSU-2 | **Retention Visual Quality Objective (High Scenic Integrity Objective)**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 23) | Controlled Surface Use: locate and design surface disturbance activities to be consistent with the visual quality objective of "retention" (or the scenic integrity of "high"), or to reclaim disturbed areas to meet the visual quality objective within 1 to 3 years from project startup. Generally, this can be met by following industry's best management practices for minimizing impacts to visual quality, along with visual quality guidelines in the Forest Plan and Forest Service Scenery Management System Handbook (Agriculture Handbook 701). | Needed to protect the long-term scenic values in areas of high scenic integrity consistent with Agency directives and the Forest Plan. The Continental Divide Trail is a designated National Scenic Trail and Highway 126 is a designated Scenic Byway. | An exception, modification or waiver may be granted if the area is reclassified to a lower visual quality or scenic integrity objective. |
| CSU-3 | **Heritage Resources**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 24) | Controlled Surface Use: avoid or minimize well pads, roads, or other surface disturbance activities within existing and proposed Management Area I boundaries. | Needed to avoid adverse impacts or an irreversible loss of heritage resources within localized areas containing a high density of highly significant heritage resource sites. These sites are eligible for inclusion to the National Register of Historic Places and meet the management emphasis for Forest Plan Management Area I. These areas represent the major cultures that once lived on the Santa Fe National Forest. | An exception, modification, or waiver may be granted if a site-specific surface use plan of operations demonstrates that adverse impacts to the heritage resources can be completely avoided, and clearance is obtained from the forest archeologist and State Historic Preservation Officer. A public notice and comment period is required prior to waiver, exception, or modification waiver of this stipulation. |
| **Timing Limitations on Lease Operations** | | | | |

| October 2014 Lease Sale<br>Santa Fe National Forest Lease Stipulations | | | | |
|---|---|---|---|---|
| **Lease Stip No.** | **Resource** | **Lease Stipulation** | **Purpose** | **Exception** |
| TL-1 | **Mexican Spotted Owl**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 21) | March 1 to August 31 | To protect and limit disturbance from drilling and construction activities within Mexican spotted owl PACs (nesting/fledgling areas) to minimize risks to reproductive and post-fledgling success of Mexican spotted owls during the critical nesting/breeding period defined in the recovery plan for this federally listed threatened species as well as the Forest Plan (Appendix D, pg. 2). Would not apply to daily operations and maintenance of producing wells. | An exception, modification, or waiver to the timing limitation may be granted if surveys according to protocol are conducted and the area is not used for nesting. A public notice and comment period is required prior to waiver, exception, or modification waiver of this stipulation. |
| TL-2 | **Northern Goshawk**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 21) | March 1 to September 30. | To protect and limit disturbance from drilling and construction within northern goshawk nesting PFAs to minimize risks to reproductive and post-fledgling success of northern goshawks during the critical nesting/breeding period defined in interagency goshawk guidelines and the Forest Plan (Appendix D, pp. 6, 10). Would not apply to daily operation and maintenance of producing wells. | An exception, modification, or waiver to the timing limitation may be granted if goshawk surveys show that the area is not used for nesting. |

| October 2014 Lease Sale<br>Santa Fe National Forest Lease Stipulations | | | | |
|---|---|---|---|---|
| **Lease Stip No.** | **Resource** | **Lease Stipulation** | **Purpose** | **Exception** |
| TL-3 | **Peregrine Falcon**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 22) | Timing limitation on drilling operations and construction activities: March 1 to August 15. | To protect and limit disturbance from drilling and construction within peregrine falcon habitat to minimize risks to reproductive and post-fledgling success of peregrine falcons during the critical nesting/breeding period, consistent with the Forest Plan (pg. 63) and Agency directives. Would not apply to daily operation and maintenance of producing wells. | An exception, modification or waiver to the timing limitation may be granted if surveys show that the area is not used for nesting |
| TL-4 | **Deer and Elk Winter Range**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 22) | Timing limitation on drilling operations and construction activities: December 15 to March 15. | To protect and limit disturbance from drilling and construction within prime deer and elk winter range to minimize risks to health during a critical period, consistent with recommendations from New Mexico Department of Game and Fish (NMDGF) and summarized under Issue 1 in Chapter 1. Would not apply to daily operation and maintenance of producing wells. | An exception, modification, or waiver to the timing limitation may be granted if the operator demonstrates that the drilling/construction location would not disrupt deer and elk winter habitat. |
| TL-5 | **Deer Fawning/Elk Calving Area**<br><br>(Santa Fe National Forest Sept 2008 Record of Decision for Oil and Gas Leasing pg. 22) | Timing limitation on drilling operations and construction activities: June 1 to July 31. | To protect and limit disturbance from drilling and construction within important deer fawning/elk calving area to minimize risks to herd reproduction during a critical period, consistent with recommendations from NMDGF and summarized under Issue 1 in Chapter 1. Would not apply to daily operation and maintenance of producing wells | An exception, modification, or waiver to the timing limitation may be granted if the operator demonstrates that the drilling/construction location would not disrupt deer fawning and elk calving. |

# MAPS


Farmington Field Office
All Nominated Parcels
October 2014
SAN JUAN
RIO ARRIBA
Farmington
Bloomfield
Navajo Lake State Park
Carson National Forest
Jicarilla Apache Indian Reservation
Santa Fe National Forest
Regina
Cuba
1874 m
1971 m
2270 m
2142 m
2074 m
2104 m
2209 m
2231 m
2507 m
Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community


Farmington Field Office
October 2014 Lease Sale
USFS and Lindrith Parcels
Parcel No. 4
676.28 Acres
Parcel No. 4
676.28 Acres
Parcel
No. 5
320 Acres
Parcel
No. 1
1035 Acres
Parcel
No. 2
160 Acres
Parcel
No. 3
200 Acres
Parcel
No. 16
160 Acres
Parcel No. 14
1110.52 Acres
Parcel No. 15
1823.68 Acres
Parcel No. 12
1572.7 Acres
Parcel No. 13
2242.62 Acres
Parcel No. 9
2409.55 Acres
Parcel No. 10
2081.62 Acres
Parcel No. 11
2305.52 Acres
Parcel No. 6
819.5 Acres
Parcel No. 7
2311.68
Parcel No. 6 Acres
819.5 Acres
Parcel No. 6
819.5 Acres
Parcel
No. 8
1078 Acres
T27N R05W
T27N R04W
T27N R03W
T27N R02W
T27N R01W
T27N R01E
T27N R02E
T27N R03E
T27N R04E
T26N R05W
T26N R04W
T26N R03W
T26N R02W
T26N R01W
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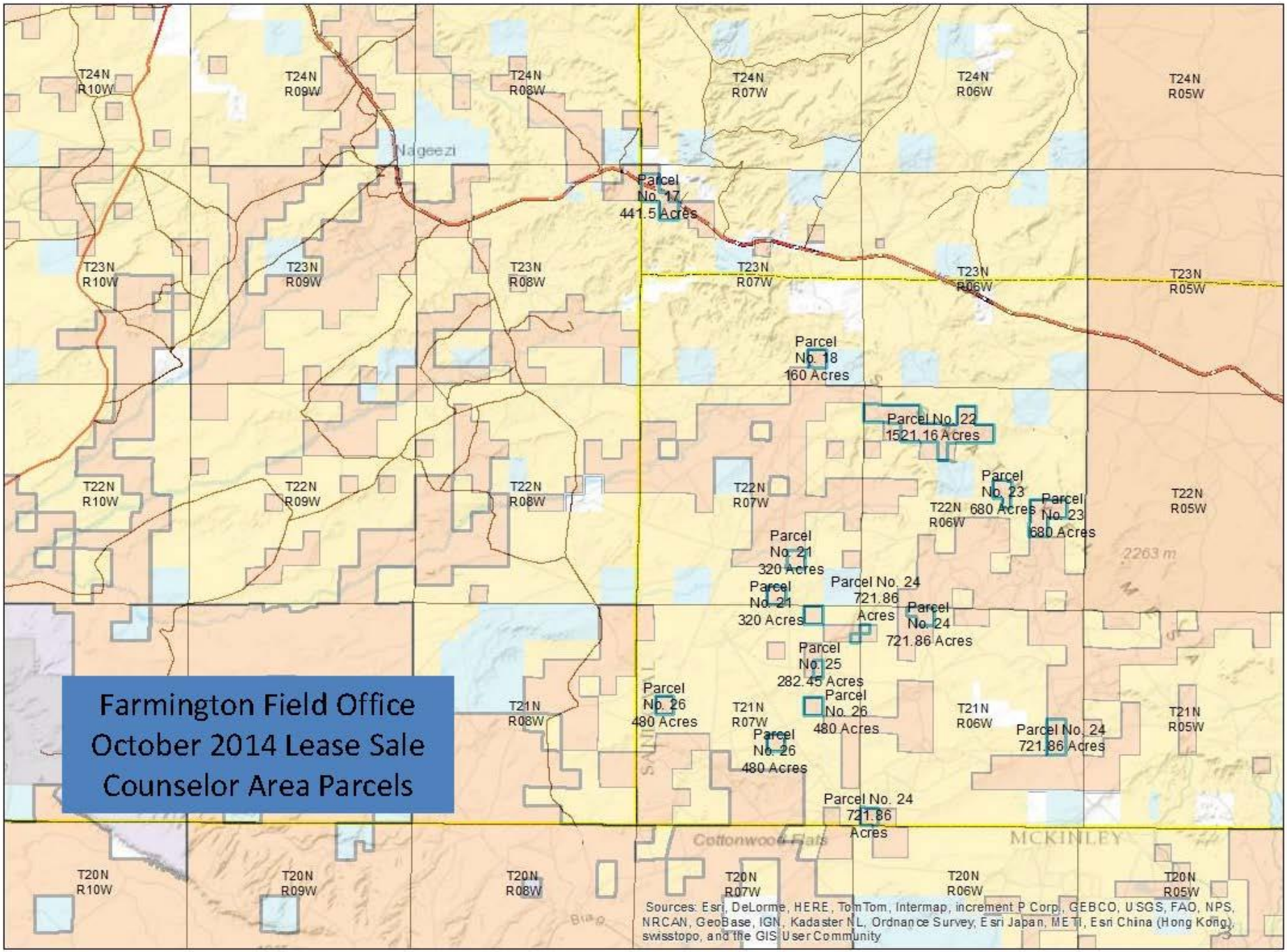
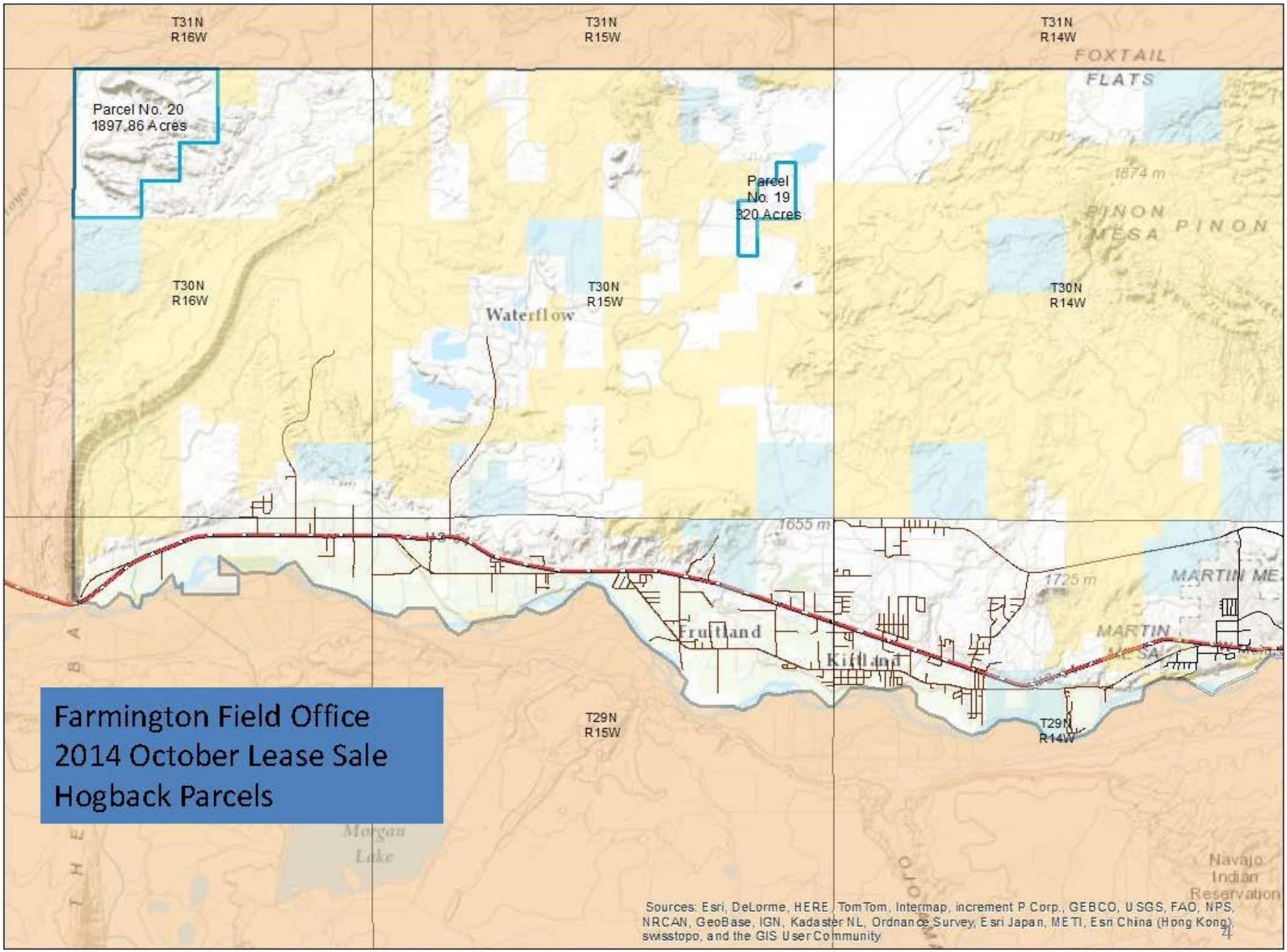
T21N R04E
WILD HORSE MESA
RIO ARRIBA
SANDOVAL
Jicarilla Apache Indian Reservation
Apache Flats
Gallina
Regina
Cuba
Mesa Laguna
Mesa los Indios
French Mesa
LLANO DEL VADO
LA JOYA DEL
Coyote
Mesa Poleo
MESA PIMPLETAL
Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community


Farmington Field Office
October 2014 Lease Sale
Counselor Area Parcels
T24N R10W
T24N R09W
T24N R08W
T24N R07W
T24N R06W
T24N R05W
T23N R10W
T23N R09W
T23N R08W
T23N R07W
T23N R06W
T23N R05W
T22N R10W
T22N R09W
T22N R08W
T22N R07W
T22N R06W
T22N R05W
T21N R08W
T21N R07W
T21N R06W
T21N R05W
T20N R10W
T20N R09W
T20N R08W
T20N R07W
T20N R06W
T20N R05W
Nageezi
Cottonwood Flats
MCKINLEY
2263 m
Parcel No. 17
441.5 Acres
Parcel No. 18
160 Acres
Parcel No. 22
1521.16 Acres
Parcel No. 23
680 Acres
Parcel No. 23
680 Acres
Parcel No. 21
320 Acres
Parcel No. 21
320 Acres
Parcel No. 24
721.86 Acres
Parcel No. 24
721.86 Acres
Parcel No. 25
282.45 Acres
Parcel No. 26
480 Acres
Parcel No. 26
480 Acres
Parcel No. 26
480 Acres
Parcel No. 24
721.86 Acres
Parcel No. 24
721.86 Acres
Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community


T31N
R16W
T31N
R15W
T31N
R14W
FOXTAIL
FLATS
Parcel No. 20
1897.86 Acres
Parcel
No. 19
320 Acres
1874 m
PINON
MESA
PINON
T30N
R16W
T30N
R15W
T30N
R14W
Waterflow
1655 m
1725 m
MARTIN ME
MARTIN
Fruitland
Kirtland
T29N
R15W
T29N
R14W
Farmington Field Office
2014 October Lease Sale
Hogback Parcels
Morgan
Lake
Navajo
Indian
Reservation
Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community